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Final-Project Report on

Hospital Management System

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and Information Technology*

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ABSTRACT

A robust platform for streamlined healthcare management is provided by Our Hospital Management System, developed using Core PHP and the Bootstrap framework, and hosted on XAMPP. A user-friendly experience is ensured for patients, doctors, and administrators. Secure registration, login, and appointment scheduling can be performed by patients, who can effortlessly access their medical and laboratory records. For doctors, a dedicated portal is offered by the platform to manage appointments, add prescriptions, and input vital reports directly into patient records. A comprehensive payroll module is integrated for doctors to securely view their paychecks. A powerful admin panel is wielded by administrators, overseeing patient details, appointments, and medical records. Efficient management of doctor information, vendors, pharmacies, and laboratories is possible, ensuring seamless procurement. Detailed insights into patient records, appointment histories, inventory status, and payroll information can be generated by administrators using the system's reporting and analytics feature. With modules for medical records and inventory management, as well as a dedicated section for surgical/theater operations, a secure, efficient, and scalable solution for comprehensive healthcare administration is presented by Our Hospital Management System.

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ABBREVIATIONS

APP	Application
CSS	Cascading Style Sheets
ED	Emergency Department
Git	Global Information Tracker
HMS	Hospital Management System
HTML	Hypertext Markup Language
ID	Identification
IT	Information Technology
JS	Java Script
MySQL	My Structured Query Language
PHP	Hypertext Preprocessor
RFID	Radio Emergency ID
UI	User Interface
UX	User Experience

Chapter 1: Introduction

1.1 Introduction

In the fast-changing health field, giving good healthcare is really important. To make healthcare run better, we suggest using a special system called Hospital Management System in each hospital. This system will help make things work more smoothly. This system has three main parts: Admin, Doctor, and Patients. It has been carefully created. HMS helps doctors and patients communicate better and make healthcare better for everyone.

In the HMS system, patients can easily sign up by giving basic information. The administrative module is in charge of creating special IDs for patients so their records can be kept in a well-organized way. Patients can make appointments with special doctors. They can see their appointment history, lab reports, and prescribed medications on a personalized dashboard when they log in. This way of putting the patient first not only makes their experience better but also gives them more control in taking care of their health.

In addition, doctors are given more power through the HMS Doctor module. Doctors can easily see all the information about the patient, so they can quickly schedule appointments, check the patient's health, and give accurate medical advice. The system helps doctors see and control patients' medical records and lab reports, so they can take better care of their health also doctor can be refer the patients to another hospital from that hospital. At the same time, the Admin module takes care of the whole system, including doctors, patients, lab services, pharmacy activities and patient pay bill or not. We want to make our hospital system more flexible so it can save time and money while still providing the best healthcare.

HMS is not just a technology concept, it stands as a fundamental element of modern health care. Its demands and goals are finely aligned with the distinct requirements and ambitions of individual health care institutions. This system delivered transparency between the health care and patients by providing both, user friendly interface systems. It will examine each requirement and objectives carefully and be able to influence the healthcare ecosystems.

1.2 Statement of Problem

The existing issues in the Nepali hospital system primarily stem from manual processes. One significant problem is that patients often lack information about the availability of specialized doctors in the hospital, making it challenging for them to identify the right healthcare professional for their needs. Moreover, many hospital management systems lack a structured doctor appointment system and detailed information about doctors, causing inconvenience for patients in terms of time and cost. Additionally, patients frequently remain unaware of the treatment fees associated with different doctors, compounding the challenges in seeking medical care.

Another critical drawback of the current system is the incapability of doctors to access a patient's previous health conditions. This limitation leads to the risk of medication duplication, especially when patients are undergoing continuous treatment. Addressing this issue is crucial not only for effective healthcare but also for providing accurate prescriptions to enhance patient health and build trust in the hospital. Furthermore, the manual system faces the problem of information loss, particularly in managing health records, further impacting patient care negatively.

Patient identification emerges as a persistent challenge within the existing Hospital Management System (HMS). Each patient needs a unique ID upon registration to track their health history systematically. This lack of a standardized identification system hampers the organization and accessibility of patient records, particularly when patients seek services at different healthcare facilities within the network. While some HMS have Patient IDs (PIDs), the inconsistency in their implementation results in situations where patients lose PIDs, forcing them to provide the same details multiple times, creating inefficiencies in the healthcare process.

1.3 Objectives

Here are some of the objectives of the project :-

- To reduce dependency on paper-based records, and enhance the overall efficiency of the hospital.

- To develop a user-friendly interface that provides patients with easy access to information about specialized doctors' availability, appointment and detailed profiles of hospital professionals.
- To implement of comprehensive appointment system , approve appointments and view by both patients and doctors.
- To Ensure transparency in disclosing the treatment fees associated with different doctors. By providing patients with information on medical expenses in advance.
- To review patients' previous health conditions and lab report. This integration is crucial for avoiding medication duplication and providing accurate prescriptions.

1.4 Scope and Limitations

1.4.1 Scope

- **User Authorization:** The system will provide secure login access for users, doctors, and administrators, ensuring proper unique ID authorization protocols .
- **Admin Control:** The administrator will have exclusive rights to add doctors, define their specializations, and manage the patient module. This includes Patient information ,doctor information, medical report ,pharmacy and vendors information ,and tracking accounting information.
- **Patient Module:** Users will be able to book appointments with their respective doctors through the online platform. The system will facilitate appointment view appointment information.
- **Doctor Module:** Doctors will have the ability to approve o appointments as per their schedule and availability.Also,doctor can view medical history ,lab report and give prescriptions to the users . If there are issues with resources and technology, the doctor will recommend transferring the patient to another hospital.
- **Enhanced Security Measures:** Robust security features will be implemented to safeguard sensitive user and medical information, ensuring confidentiality and compliance with privacy regulations.

- **Efficient Appointment Management:** The system will optimize the process of appointment request, approval, appointment history contributing to streamlined operations and improved user experience.
- **Scalability:** The system will be designed to accommodate future expansions and enhancements, ensuring its adaptability to the evolving needs of the healthcare environment.
- **Training and Support:** Comprehensive training modules and ongoing support will be provided to users, doctors, and administrators to ensure effective utilization and troubleshooting.

1.4.2 Limitations

Although HMS is a very useful web application for hospital , there are some limitations. Some of the limitations are:

- **Payment Gateway Integration:** In our system lack of payment gateway.
- **HMS is used for a single hospital:** It implies that the HMS is not designed as a generic or universal solution for multiple hospitals .
- **Appointment Date and Time:** This system lacks the capability to provide an appointment schedule and specific time.
- **Limited Appointment Control for Doctors:** Currently, doctors can approve appointments, but there is no option for them to cancel appointments.

1.5 Methodology

The Agile project management methodology is employed in our hospital management system, emphasizing constant collaboration and iterative work processes. It is one of the most popular approaches to project management because it is flexible, it is adaptable to changes and it encourages customer feedback. The foundation of this approach lies in the belief that a project can undergo continuous improvement throughout its life cycle and swiftly adapt to changes [1].



Figure 1.1 Agile Model [2]

1.6 Report of organization

This report of the hospital management system is divided into six chapters.

Chapter one, describes the overview of the hospital management system followed by a problem statement in the traditional hospital system. The system objectives, scope limitation and development methodology of the system.

Chapter two, background study includes the study of nepali hospital system and today's conditions of various hospital systems. The literature reviews include the research papers, documentation, theories, articles related to the hospital management system and existing system also.

Chapter three, a details analysis of system including functional and non functional requirement of hospital management system followed by feasibility study including technical, operational, economical and schedule feasibility. Also includes use case, class, activity (doctor, patient, admin), and gantt chart.

Chapter four, includes the architecture design of the system that includes the component design, system architecture.

Chapter five, describes the implementation and testing of the system. It describes the useful tools to be used, development programming language, database platform, software tools to be used to locally hosting the system, testing the system and some screenshots.

Chapter six, describes the conclusion and future recommendation of the system.

Chapter 2: Background Study And Literature Review

2.1 Background Study

Historically, Nepal's healthcare system relied predominantly on manual processes, characterized by paperwork, fragmented data, and limited technological integration. The gradual evolution towards automation and digitalization was fueled by the pressing need for efficiency, accuracy, and improved patient care. This transformation gained momentum as advancements in technology became more apparent, coupled with a growing awareness of the benefits offered by digital healthcare solutions. The desire to align with global standards further accelerated the adoption of hospital system.

Technologies, played an essential role to mitigating the pressure that health systems faced due to the increase in health costs, growth of chronic diseases, population aging, population's expectation for more personalized health and, added to that, the confrontation of Covid-19 pandemic [3] . In this sense, we identified the lack of maturity models that address the adversities that occurred during the Covid-19 pandemic in health systems for better hospital management and avoid the pressure to which they could be subjected again.

In this busy world, we don't have time to wait in questionable long lines at hospitals. The problem is that the queues at the hospital are often run by administrative staff, then they take a token there and then we wait for our turn, then we ask the doctor and the most frustrating thing we have ever gone there when we traveled a long distance and then we will know, the doctor is on vacation or the doctor cannot accept appointments. It will help us overcome all these problems because now patients can make appointments at home and check in with the doctors they want to see. Doctors can also confirm an appointment, which helps both the patient and the doctor, because if the doctor refuses the appointment, the patient will know in advance, and the patient will visit the hospital only when the doctor confirms the appointment, saving the patient time and money . In this project hospital management systems is work efficiency and waiting time between different processes, departments and people. This paper addresses such limitations of existing systems and proposes RFID (Radio Emergency ID) and wireless sensors, location and data management framework that facilitates real-time tracking of hospital assets, staff and patients as part of preprepared procedures. daily hospital operations. The system includes visual simulation

and provides the ability to analyze ongoing process so that adjustments can be made to improve process efficiency and service level [4].

2.2. Literature Review

In the literature review section we discuss our project related journals, documentations, and research papers. The information that has been collected from google scholar, official websites and newspapers articles that helps us to better understand our potential risks, problems for developing the HMS. Also understood what are the requirements, how to successfully implement HMS.

Hospital Management Information system has an important role in increasing the effectiveness and efficiency of hospital services. However, the implementation of the information system is complex and requires a large investment [5]. To prevent failure it is important to know the success factors in the implementation of HMIS. So the factors are Human, Technology, Finance, Functionality, Organizational Environmental factors. HMIS is a computer-based medical information system for patient care and hospital management. HMIS is computerized financial administrative and patient care activities in hospitals, produce management report and operational statistics, and offers a powerful query module.

Emergency- and disaster-preparedness was an important issue and a global problem in COVID-19. Through free online consultation, the hospital preliminarily judged the treatment urgency, recommended nonemergency patients to delay hospital appointments or visit other non hospitals, provided low-suspected patients treatment instruction when self-isolating at home, and invited high-suspected patients to the Fever Clinic via the green channel. The online clinic effectively alleviated the ED workload and facilitated early detection of potential cases. In this hospital adopted interim measures, including online consultation, region separation, and epidemic priority, to alleviate the pressure in the clinical work, reduce the cross-infection, and strengthen the protection of high-risk staff. The hospital held the “zero infection” record, which was far lower than the simultaneous outside-Hubei mean level of 3.4% in late January [6]. The zero infection indicated the flexibility and validity of our interim hospital management strategy.

The objectives, characteristics, and uses of hospital pharmacy work-measurement systems are discussed, and the development and operation of an experimental hospital pharmacy management information system (HPMIS) is described. Hospital pharmacy work-

measurement systems are designed to measure and evaluate the productivity of a hospital pharmacy or group of pharmacies. Previous work-measurement systems used by hospital pharmacies have been too time consuming or imprecise for widespread use. A national hospital pharmacy work-measurement system known as HPMIS was developed to provide comprehensive and widely applicable information on pharmacy expenses, personnel use, and productivity. HPMIS converts data from participating hospitals into 17 indicators that enhance the comparability of the information between the hospitals. The 17 indicators relate to pharmacy production, clinical services, and administrative functions; also included are several gross department indicators that combine elements of all three areas. After analysis and categorization of the data according to characteristics such as bed size, geographical location, and type of drug-distribution system, results are reported to individual hospitals [7].

Medical appointment non-adherence affects health outcomes and costs. Evidences have shown that nearly 40% patients did not adhere to their treatment, fail to keep appointments or follow doctor's recommendations [8]. In this system sending reminders via e-mail and text message is one common intervention to enhance patient's adherence. The aim of the study is to provide an effective reminder system to improve patient's adherence on medical appointment. Using the input-process-output-outcome scheme, we developed a reminder system through web-based and mobile phone application. This reminder system facilitates the communication between patient and clinic staff. We tested this application among programmers and patients in a primary clinic. The reminder system was applicable to be used by medical staff in a primary clinic. Patients could easily download the application and put in appointment schedule; while clinic staff could check and set reminder system for patients. This reminder system is useful for patient to set medical appointment and to be reminded of their appointment one week, three days, and one day before. The reminder used email notification and SMS gateway to increase the effectiveness.

According to documentation while implementation of HMIS in Mumbai City Hospital occurs many challenges in Gastroenterology department find issues use different system for capturing endoscopy report. Similarly, the Psychiatry department found the issues as soon as the recreational activities started for admitted patients, the Head of Department of psychiatry department entered the In-door Patient Department area . Likewise issues occur in Blood Bank services, Radiology and Laboratory department [9].

A set of 300 electronic medical records was randomly selected and evaluated against eleven checklists in terms of documentation of medical information, availability, accuracy and ease of use. To get the opinion of the care-providers on the electronic medical records system, ten physicians and ten nurses were interviewed by using of semi-structured guidelines. The results were also compared with a prior study with 300 paper-based medical records. As a result quality of documentation of the medical records was improved in areas where nurses were involved, but those parts which needed physicians' involvement were actually worse. High workloads, shortage of bedside hardware and lack of software features were prominent influential factors in the quality of documentation [10]. The results also indicate that the retrieval of information from the electronic medical records is easier and faster, especially in emergency situations. Some factors such as low physician acceptance of the electronic medical record system, lack of administrative mechanisms (for instance supervision, neglecting physicians and/or nurses in the development and implementation phases and also continuous training), availability of hardware as well as lack of specific software features can negatively affect transition from a paper-based system to an electronic system .

For the report, associations with future fractures are grouped by type of preexisting fracture; the order of presentation here reflects the sequence and incidence often observed in clinical practice. Wrist and spine fractures are two of the most common osteoporotic fractures. The incidence of these two fractures begins to increase rapidly soon after menopause [11]. As such, wrist and spine fractures represent harbingers of subsequent hip fractures and additional fractures at the spine and other skeletal sites .Details of each report identified, including study design, age range, number of observations, gender, length of follow-up, and so forth, are provided in the appendices, along with the published relative risk estimates and 95% confidence intervals where available. Some studies reported the results of sub analyses, restricted to certain age ranges or fracture sites, or adjusted for additional covariates, and these results are also tabulated.

2.4 Study of Existing System

1)Midas Health Services:

Midas Health Services, a leading healthcare information system provider in Nepal, has gained prominence through its two decades of expertise, offering reliable hospital management solutions and introducing “Mero Doctor”, a cloud-based healthcare platform. They prioritize technology integration, fostering digital health inclusion, and envisioning a comprehensive healthcare ecosystem. Committed to providing trustworthy and secure solutions, they’ve introduced cashless insurance in Nepal, with client testimonials affirming the positive impact of their services. Midas Health Services remains dedicated to improving and evolving its system based on client and user feedback solidifying its position as a healthcare solution leader [12].

2)NepalSoft

Hospital Management Systems generate comprehensive reports and analytics, offering valuable insights into hospital operations, patient trends, and performance indicators. These data-driven insights empower administrators to make informed decisions, identify areas of improvement, and implement strategies to enhance the overall efficiency and effectiveness of healthcare services. By leveraging the power of data, hospitals in Nepal can continuously evolve and adapt to meet the evolving healthcare needs of the population. Hospital Management Systems have emerged as indispensable tools for the healthcare sector in Nepal. By automating processes, optimizing resource allocation, improving communication, and facilitating data-driven decision-making, HMS plays a vital role in streamlining healthcare services across the nation. As Nepal continues to develop its healthcare infrastructure, embracing and implementing robust Hospital Management Systems will be crucial for delivering quality care, enhancing patient experiences, and achieving sustainable healthcare development [13].

Chapter 3 : System Analysis

3.1 Requirement Analysis

Data required for requirement identification was collected from following sources

- Brainstorming
- Module Content Analysis
- Document Review
- Group Discussion

3.1.1. Functional Requirement

- **User Authorization:** Patients, Doctors, and Administrators: The system must have secure authorization mechanisms to ensure that only authorized individuals (patients, doctors, administrators) can access and perform actions within their respective roles using their unique id.
- **Appointment Management :**Doctors: Doctors should have access to an appointment list, allowing them to manage their request appointment and approve appointments if they are available.
- **Doctor Assignment:** Administrators should have the capability to assign available doctors to the hospital with their specialized .
- **Patient Search:** Administrators and Doctors should be able to search for patients using their name and phone number or unique id .
- **Medical History Management:** Administrators should maintain patients' medical history information. Doctors must be able to add patients and manage patient information and medical history. Patients should have access to view their medical history.
- **Manage Patient ,Doctors:** Admin can be add delete and update the information of the doctor and patients.
- **Manage Lab Report:** Admin can assign a lab report ,and that is access both patient and doctor .Doctor can be update the record and add prescription to the patient.
- **Add Prescription:**Doctors and admin can add a prescription about patients health conditions.

Use case :

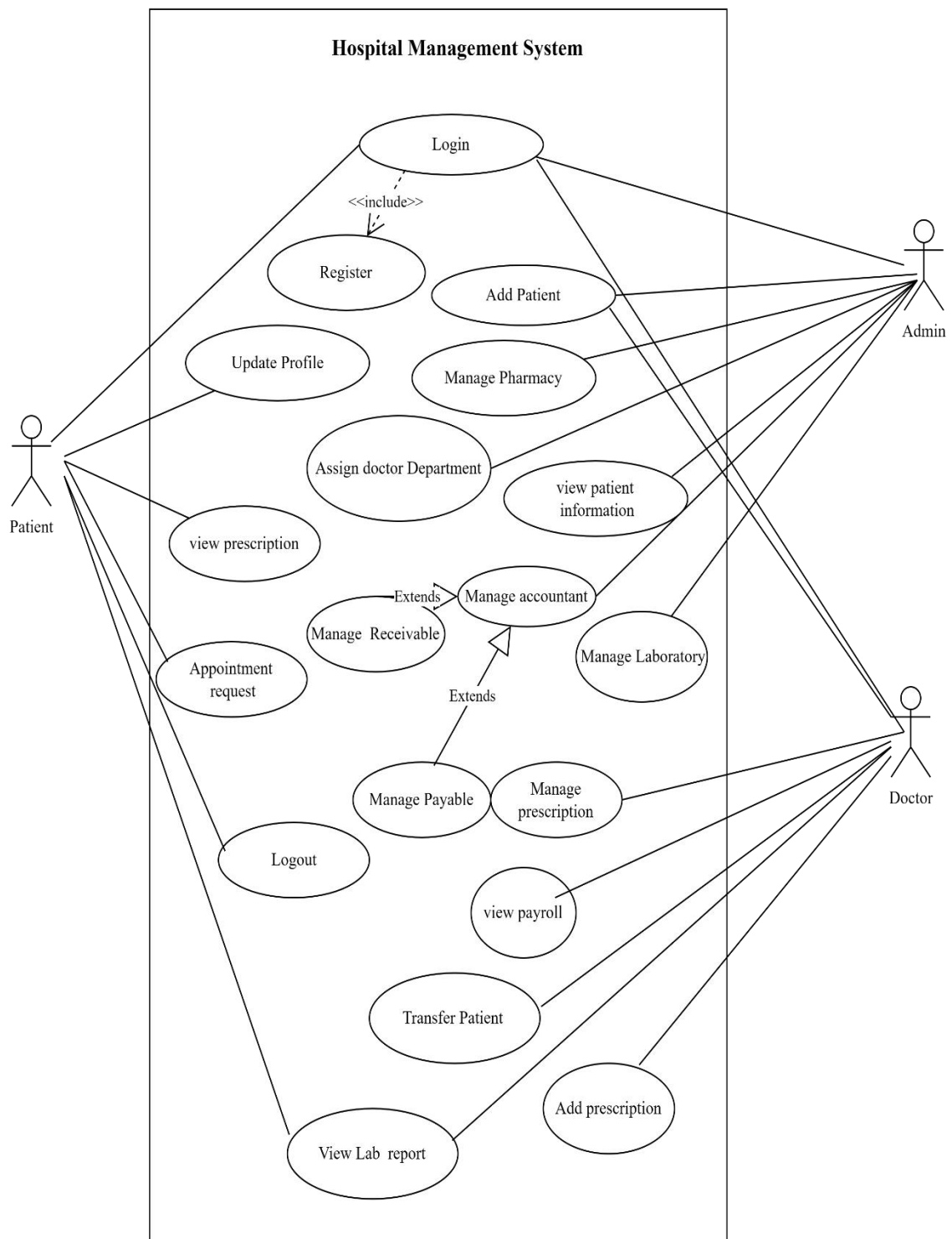


Figure 3.1:Use Case Diagram of HMS

3.1.2 Non-Functional Requirements

- **Data Security and Privacy**

Ensure data encryption, access control.

- **Scalability and Performance**

It's vital to maintain consistent responsiveness and performance, especially during peak usage, for an efficient user experience. Balancing growth accommodation and sustained functionality is key to overall system reliability and success.

- **Reliability and Availability**

Ensure system availability and minimize downtime by implementing robust backup and disaster recovery procedures.

- **Usability and User Experience**

Create a straightforward and user-friendly interface by prioritizing UI and UX design elements. Emphasize simplicity in design for an enhanced user experience.

- **Performance Monitoring and Reporting**

Provide tools for system admin to monitor performance and generate a report.

- **Training and Support**

Offer training program for maximum adoption of the system.

- **Cost and Resource Management**

Optimize system resource usage for cost control while strategically planning for future scalability and resource needs. Ensure efficient resource utilization and anticipate scalability requirements for long-term planning.

3.2 Feasibility Study

The aim of this feasibility study is to assess the viability of implementing a Hospital management system, designed to streamline administrative processes and enhance overall efficiency in hospital operations.

3.2.1 Technical Feasibility

Integrating technology into hospital management requires suitable hardware and software, ensuring compatibility with existing healthcare infrastructure and standard information systems. Detail the technologies you plan to use (HTML, CSS, JS, PHP). Specify any additional tools or libraries required (e.g., frameworks like jQuery, Bootstrap, or databases

like MySQL).Plan for a responsive and user-friendly design.Implement a data backup strategy to prevent data loss.

3.2.2 Operational Feasibility

To minimize disruption to current work processes, prioritize user-friendly interfaces and provide comprehensive staff training programs for smooth adoption. These changes have the potential to boost daily operational efficiency and save time.

3.2.3 Economical Feasibility

Technologies used in the development of the project HMS are HTML, CSS, JS and PHP which are open source and available for free. The project that we developed is economically feasible in the sense that it does not require high budget, investment, initial fund to develop and, only free software tools are used to develop. Also while implementing, the server cost were comparatively cheaper and could economically feasible for the user as PHP servers are comparatively cheaper.

Table 3.1:- Cost Analysis

Work	Cost
Back-end Development	20,000
Database Setup	5,000
Front End Development	15,000
Documentation	6,000
Internet	3,000
Others	5,000
Total	54,000

3.2.4 Schedule Feasibility

Estimate timeline for development, testing and implementation as consideration of potential delays and calculating risks, we design a gantt chart for HMS.

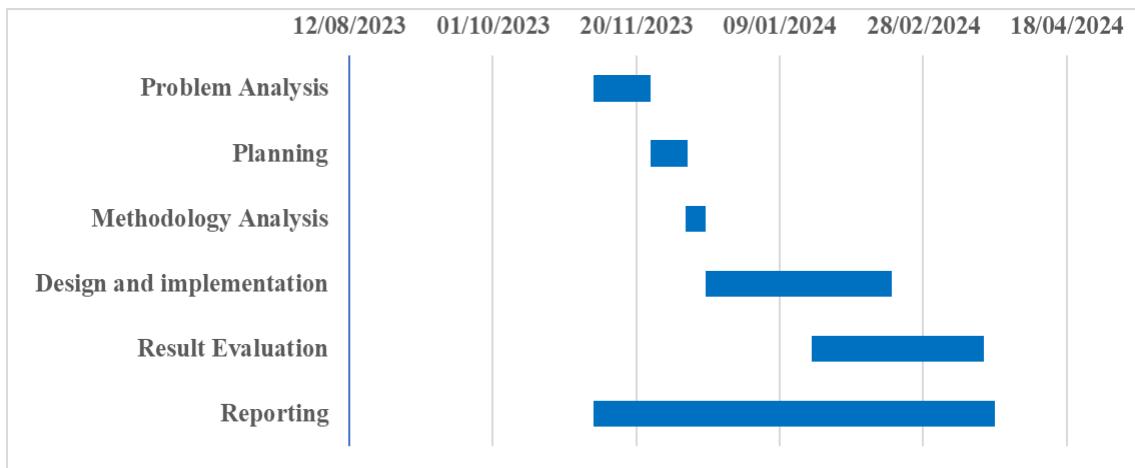


Figure 3.2:- Gantt chart to make HMS

3.3 Analysis

3.3.1 Class Diagram

The provided PlantUML class diagram illustrates the structure of a Hospital Management System database, encapsulating key entities and their relationships. The system involves administrative staff (hms_admin), doctors (docs), patients (patients), appointments (appointments), laboratory records (laboratory), medical records (medical_records), payroll information (payrolls), pharmaceutical products (pharmaceuticals), and prescriptions (prescriptions). Administrative staff oversee various aspects, including appointments, doctors, laboratory records, medical records, payroll, pharmaceuticals, and prescriptions. Doctors interact with patients, manage appointments, and contribute to medical records, prescriptions, and other related entities. Patients are associated with doctors, appointments, and medical records. The system also incorporates pharmaceutical management and payroll systems. The diagram provides a comprehensive overview of the entities, their attributes, and relationships within the Hospital Management System.

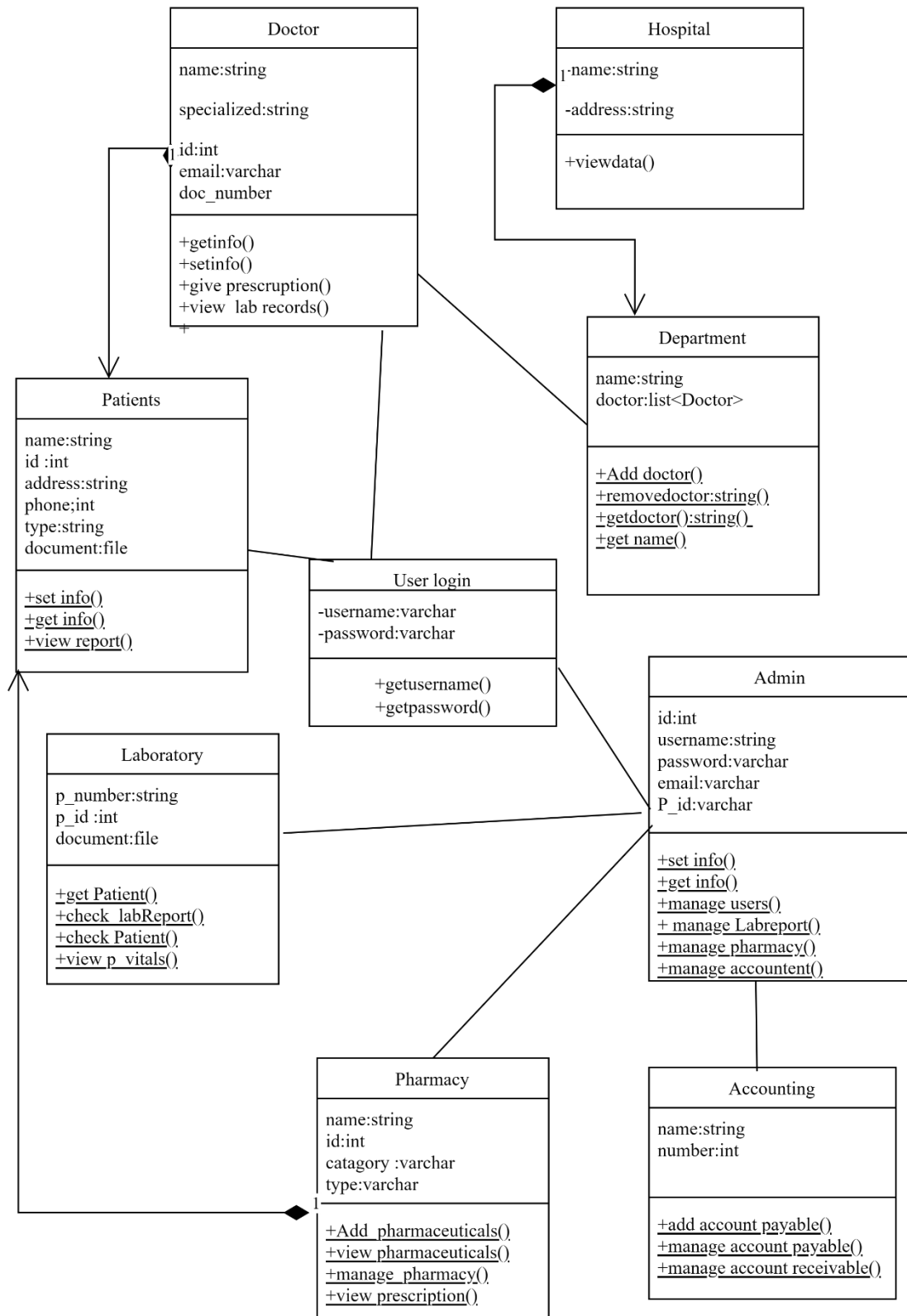


Figure 3.3: Cass diagram of HMS

3.3.2 Activity Diagram

The below diagram is the activity diagram of the system HMS. It depicts its behavior. It is the graphical representation of the system workflow.

- **For patients**

The patient activity diagram would show the steps a patient goes through in a hospital management setting. This could include registering, checking in for appointments, seeing doctors or specialists, receiving treatment, and following up with medical records. The specific steps would depend on the context and purpose of the diagram .

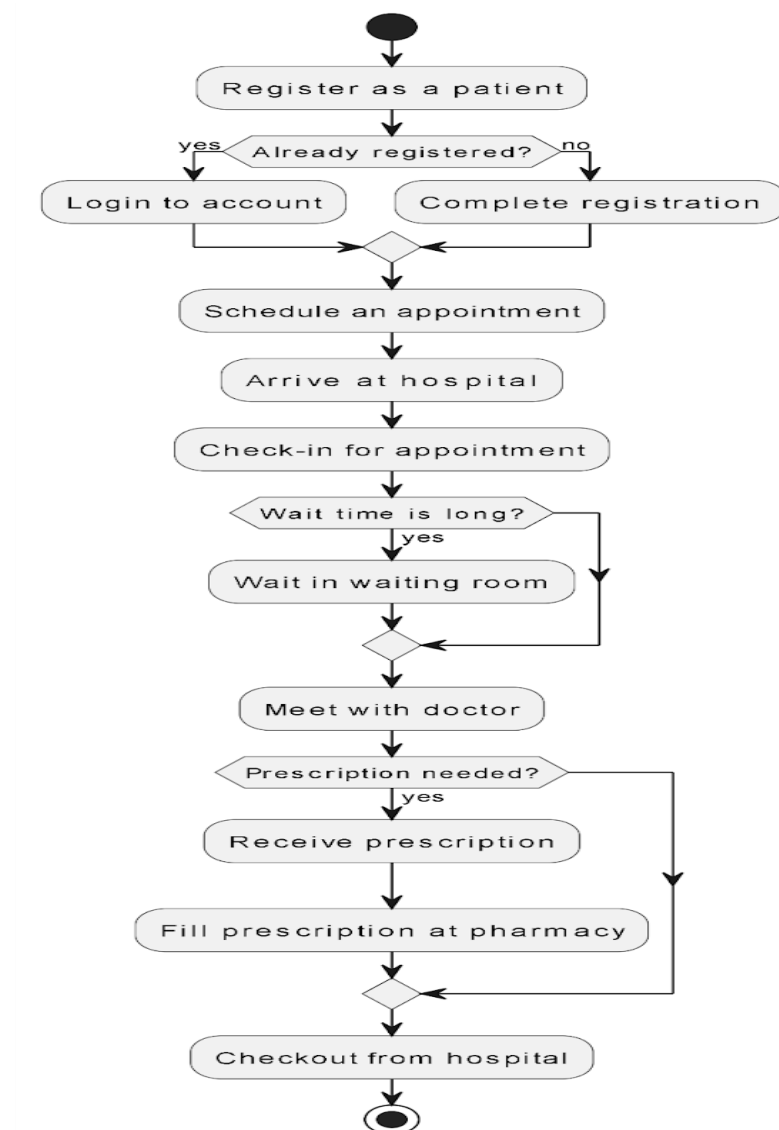


Figure 3.4 :-Activity Diagram for Patients

- For Doctors:** The doctor activity diagram outlines the doctor's interaction with a hospital support system. It begins with the doctor logging in, checking appointments, and viewing existing medical records if available. If no records exist, the doctor creates them and proceeds to prescribe medication. After prescribing, the doctor updates the patient's medical records and confirms appointment completion. This diagram offers insights into the doctor's workflow, including login, appointment checking, record management, prescription, and appointment confirmation. It aids administrators and system designers in understanding doctor-specific system needs.

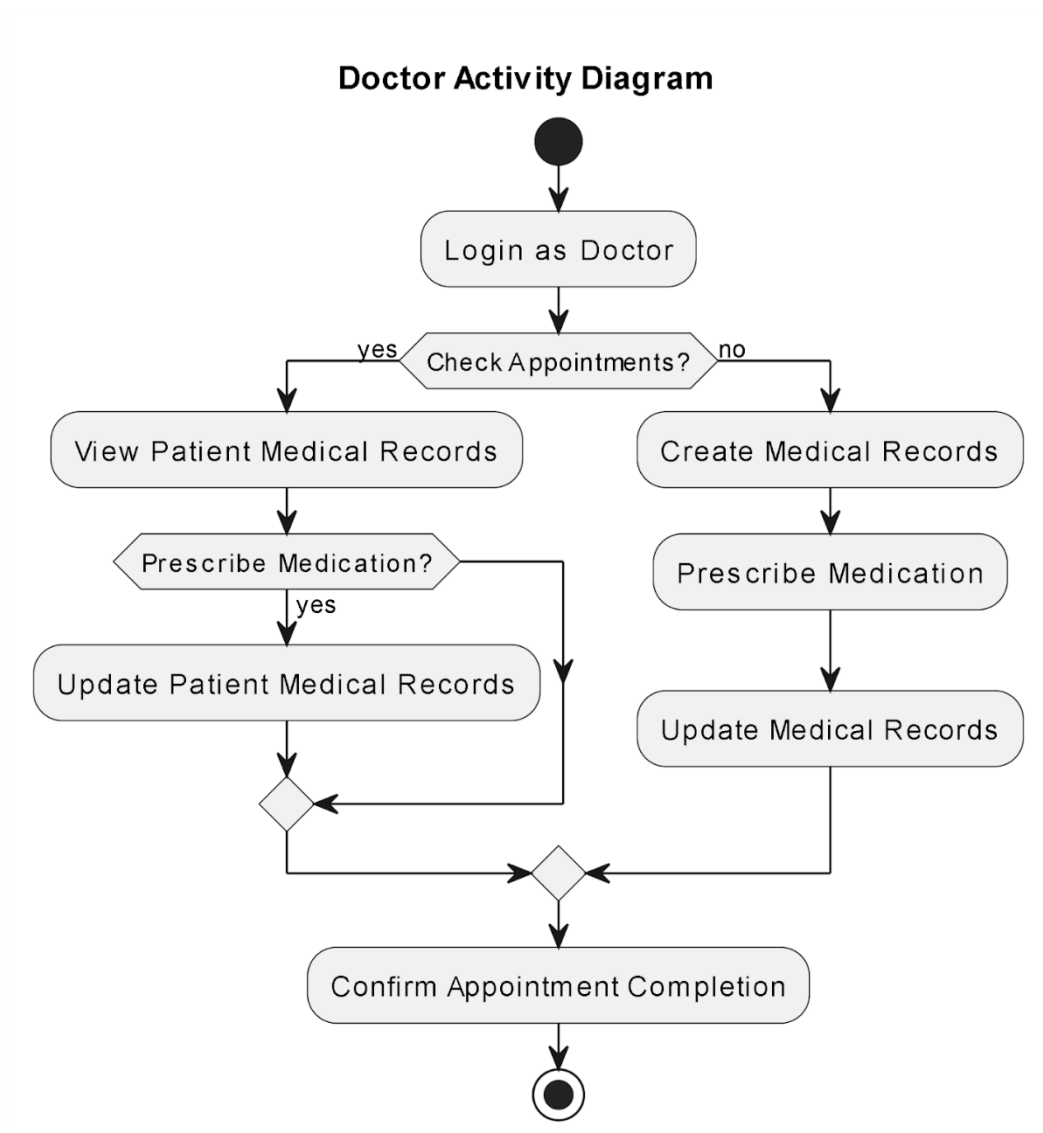


Figure 3.5 : Activity Diagram For Doctor

- **For Admin**

The activity diagram illustrates the key actions performed by an admin in a hospital management system. Admin activities include viewing and modifying appointment, managing doctor information, overseeing laboratory records and pharmacy inventory, generating payroll, and handling assets and equipment.

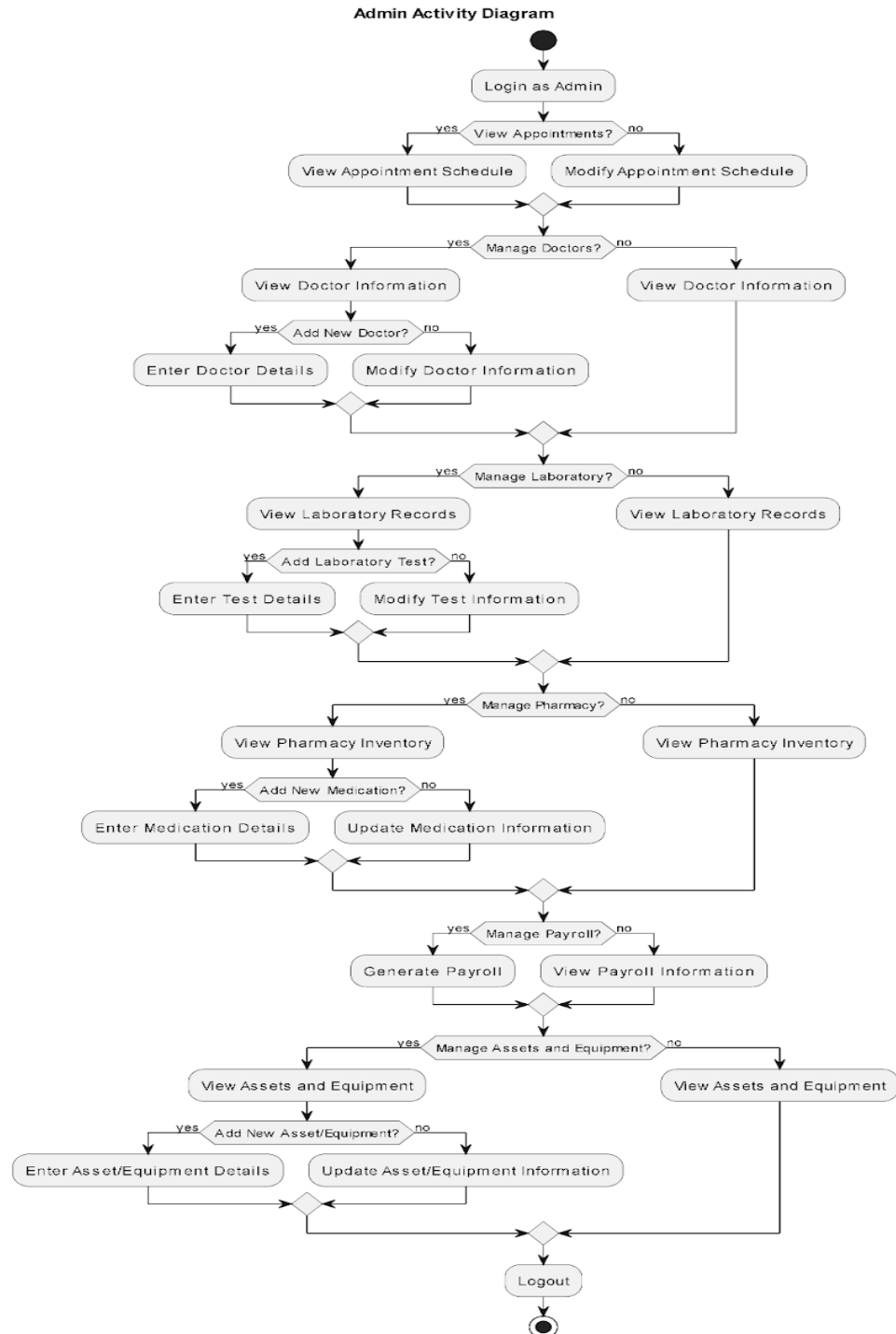


Figure 3.6:- Activity Diagram for Admin

3.3.3 Sequence Diagram :

The depicted Sequence diagram illustrates the process of appointment management involving the patient, doctor, and admin. It outlines the activities of logging in for appointments, registering, and viewing records . The diagram captures the dynamic interactions among these three entities within the context of the functionalities.

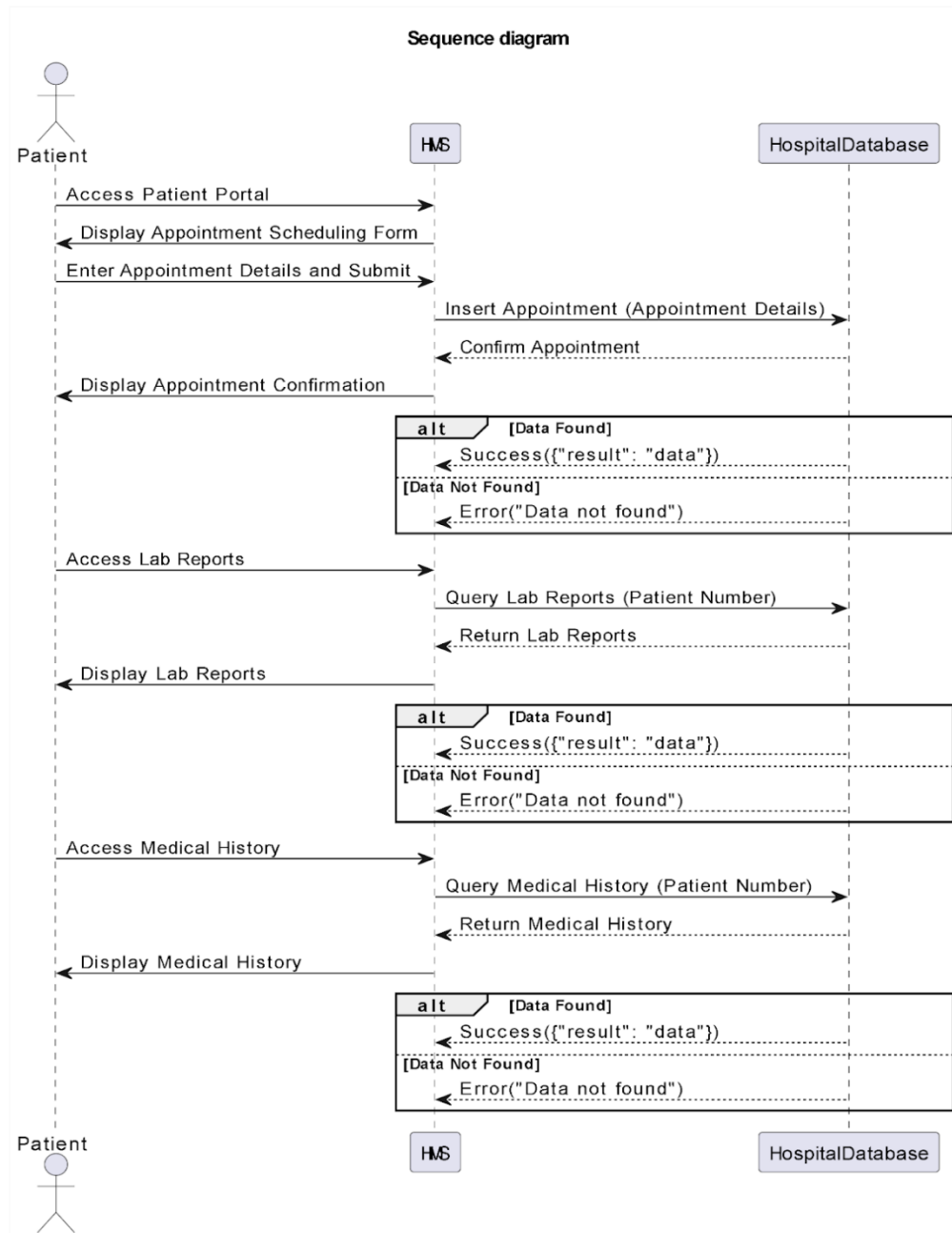


Figure 3.7:- Sequence Diagram of HMS

Chapter 4: System Design

4.1 System Design

System design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements.. The goal is to create a well-organized and efficient structure that meets the intended purpose while considering factors like scalability, maintainability, and performance [14].

4.1.1 Component Diagram

User Interface components ensure a tailored experience for patients, doctors, and administrators, while functional modules such as Appointments, Doctor Portal, and Admin Panel. The system's backbone lies in specialized modules like Medical Records and Surgical/Theater Operations. A robust Database Component manages patient, doctor, inventory, and payroll data, supplemented by an External Entities Component for efficient collaboration with vendors and pharmacies. Together, these components form an integrated, secure, and efficient healthcare administration solution.

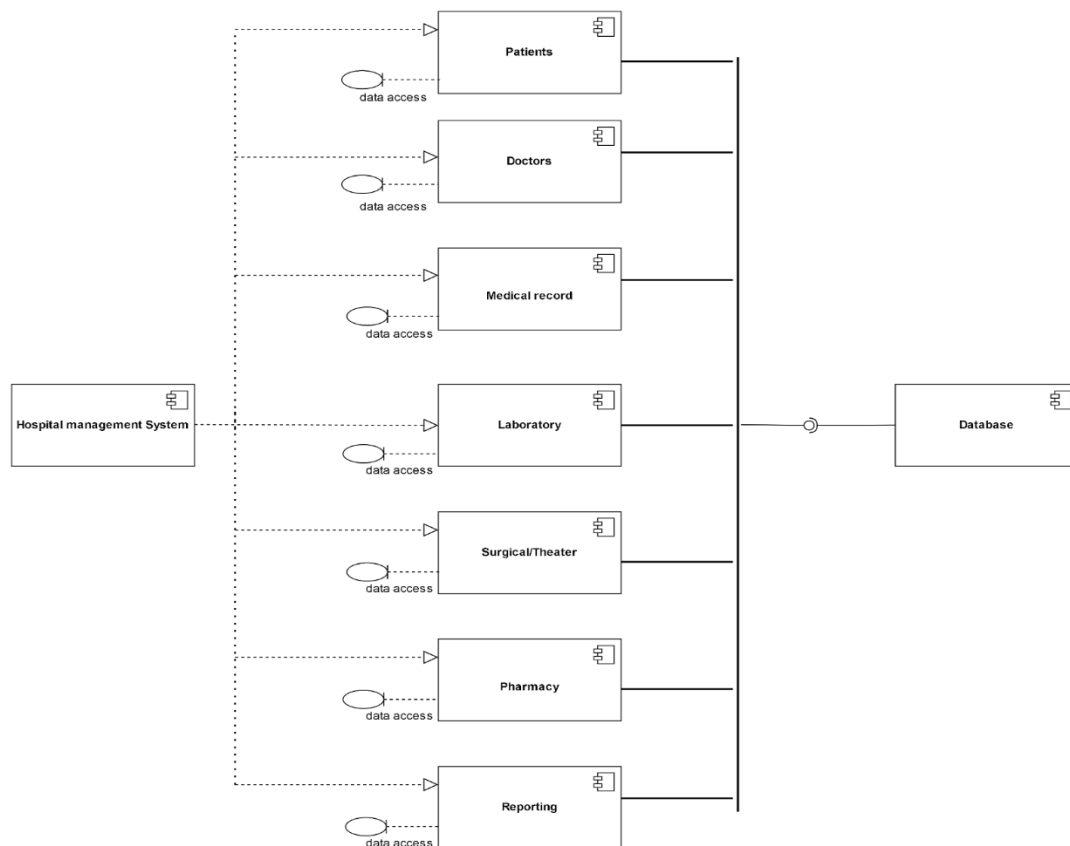


Figure 4.1:-Component Diagram

4.1.2 System Architecture Design

In our Hospital Management System architecture, users access the system through their web browsers, interacting with a user-friendly interface. The Apache web server receives and processes their requests, connecting to the PHP application logic that manages the core functionalities of the system. This includes handling business rules, database interactions, and overall system operations. The MariaDB database stores crucial information such as patient records, appointments, and medical data. The presentation layer, comprising HTML, CSS, and JavaScript, ensures a seamless and responsive user experience. Our development environment utilizes XAMPP, integrating Apache, MariaDB, and PHP to create a cohesive and efficient system for hospital management.

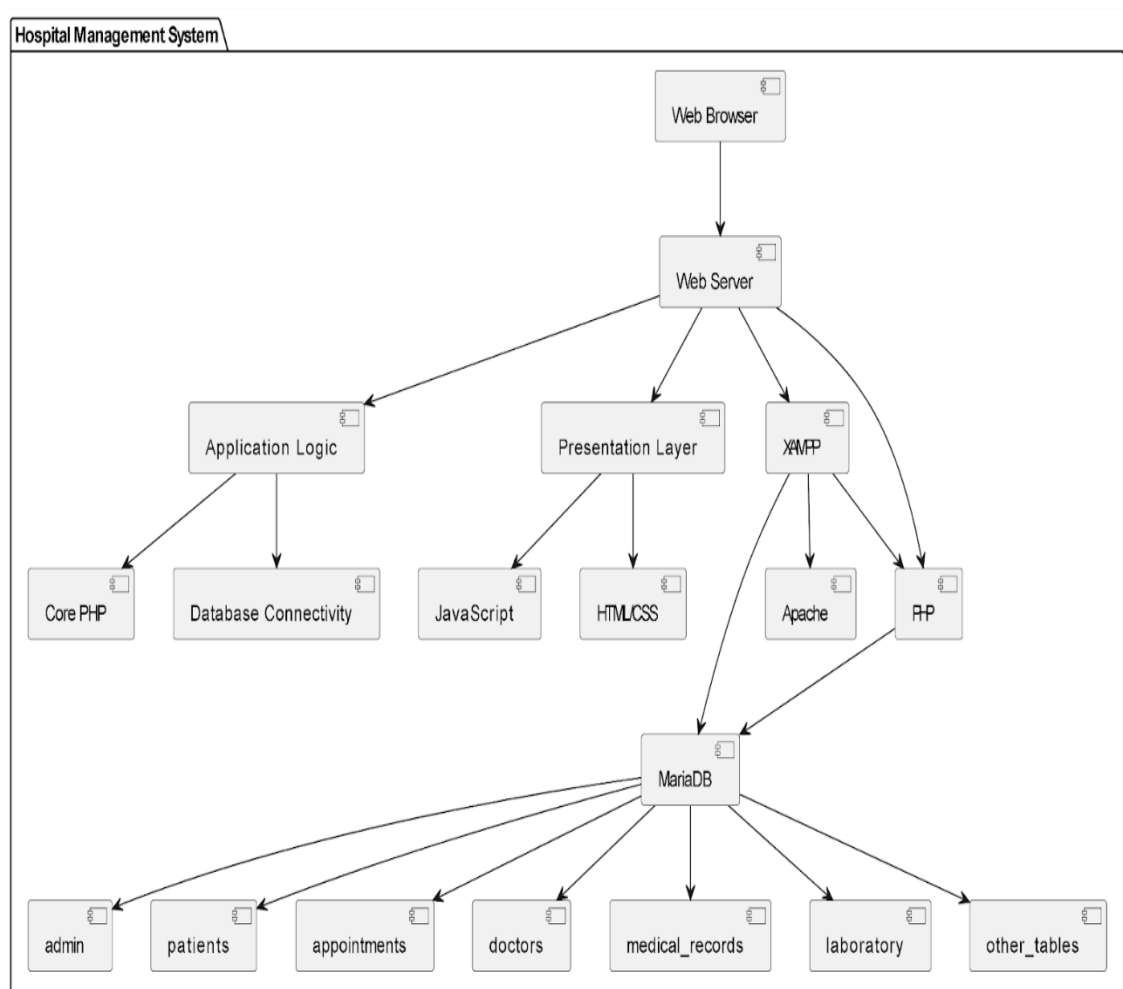


Figure 4.2:- System Architecture

Chapter 5: Implementation and Testing

5.1. Implementation:

Implementation is a critical phase that marks the transformation of design specifications into a functioning system. It involves the actual construction and deployment of the software or system outlined during the design phase..

5.1.1. Tool Used:

Programming Languages:

- **PHP:**

PHP is a server-side scripting language designed for web development. It is chosen for the hospital support system due to its ability to handle server-side logic effectively, making it suitable for tasks such as user authentication, database interactions, and dynamic content generation.

- **HTML (Hypertext Markup Language):**

HTML is the standard markup language for creating and structuring web pages. Chosen for its fundamental role in structuring content, HTML forms the backbone of the hospital support system's user interface, ensuring accessibility and consistency.

- **CSS (Cascading Style Sheets):**

CSS is a style sheet language used for describing the presentation of a document written in HTML or XML. Employed in the hospital support system to enhance user experience and maintain a consistent visual identity, CSS allows for effective styling and layout management across the application.

- **JavaScript:**

JavaScript is a high-level, interpreted programming language. Selected for its capability to provide dynamic and interactive features on the client-side, JavaScript enhances the hospital support system's user interface, allowing for real-time updates, form validation, and seamless user interactions.

Database platform:

- **MySQL :**

MySQL is a domain-specific language used for managing and manipulating relational databases. It is selected for the hospital support system because of its robust capabilities in handling database operations, allowing efficient storage and retrieval of medical and administrative data

5.1.2 Software Tools Used:

- **XAMPP:**

XAMPP, a comprehensive web development stack, was chosen for the hospital support system to create a unified and easily deployable environment. It integrates Apache for web server functionality, MySQL for database management, PHP for server-side scripting, and Perl for additional scripting capabilities, streamlining the development and testing process. This bundled solution enhances efficiency and ensures compatibility among essential components of the system.

- **Visual studio code:**

Visual Studio Code was selected as the integrated development environment (IDE) for the hospital support system due to its lightweight yet powerful features. Its extensive support for various programming languages, built-in version control, and a rich ecosystem of extensions make it an ideal choice for collaborative development and efficient code editing, contributing to the overall productivity of the development team.

- **GitHub:**

GitHub was selected as the version control and collaboration platform for the hospital support system due to its robust features in managing code repositories. GitHub facilitates seamless collaboration among developers, enabling them to track changes, manage issues, and coordinate through pull requests.

- **Draw.io:**

Draw.io was chosen for creating visual representations of the hospital management system's architecture, workflows, and database structures. The tool's versatility in

generating diagrams, flowcharts, and UML diagrams aids in illustrating complex concepts and processes.

5.2. Testing:

Testing is the essential process of ensuring the software is free from errors and meets the expected requirements of the actual program. This vital procedure includes assessing the application at various stages, including system testing for integrated functionality and unit testing for individual components. To ensure the proper functioning of each component, thorough testing can be conducted.

5.2.1. Unit Testing:

Unit testing involves the examination of individual units or components within a software system. Our team conducted manual tests where members meticulously verified that the specified components of the system exhibited the anticipated behavior.

Table 5. 1:Test Case 1: Admin log in

S.N	Test Input	Expected outcome	Actual outcome	Result
1.	Email address: admin@gmail.com Password: Password@123	Log into admin dashboard	Logged into admin dashboard	Test successful(Keshav Admin dashboard)
2	Email address: admin@gmail.com Password: Password123	Not Log into admin dashboard	Access Denied Please Check Your Credentials	Test successful

Table 5. 2: Test case 2: Doctor log in

S.N	Test Input	Expected outcome	Actual outcome	Result

1.	Doctor Number: MKTWQ password:Password@123	Log into doctor dashboard	Logged into doctor dashboard	Test successful (Menaka Pun doctor dashboard)
2.	Doctor Number: MKTWQ password:Password123	Not Log into doctor dashboard	Access Denied Please Check Your Credentials	Test successful
3.	Doctor Number: AKTWQ password:Password@123	Log into doctor dashboard	Logged into doctor dashboard	Test successful (Roshan Paudel doctor dashboard)
4.	Doctor Number: AKTWQ password:Password123	Not Log into doctor dashboard	Access Denied Please Check Your Credentials	Test successful

Table 5. 3 : Test case 3: New User(Patient) Registration

S.N	Test Input	Expected outcome	Actual Outcome	Result
1.	Full Name: Roshan Paudel Email Address: roshan@gmail.com Phone:12345 Password: Password@123	New user(patient) Registration should be successful	Registration successful	Test successful

2.	Full Name: Suman Pun Email Address: suman@gmail.com Phone:98765 Password:Password@123	New user(patient) Registration should be successful	Registration successful	Test successful
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Table 5. 4:Test case 4: user(patient)log in

S.N	Test Input	Expected Outcome	Actual Outcome	Result
1.	User name: Roshan Paudel Password:Password@123	Log into user dashboard	Logged into user	Test successful
2.	User name: Suman Pun Password:Password@123	Log into user dashboard	Logged into user	Test successful
3.	User name: Sanjita Thajali Password:Password123	User should not logged in	User is not logged in	Test successful

Table 5. 5:Appointment:(patient)

S.N	Test Input	Expected Outcome	Actual Outcome	Result
1.	First name: Sanjita Last name: Thajali DOB: 12/12/2002 Age:21 Address: Narchyang	Appointment Request Successful	Success	Test successful

	Mobile:34567 Patient Aliment:TEST Patient's Type:Appt Req			
2.	First name: Suman Last name: Pun DOB: 12/12/2001 Age:22 Address: Narchyang Mobile:98765 Patient Aliment:TEST Patient's Type:Appt Req	Appointment Request Successful	Success	Test successful

Table 5. 6: Appointment Status:(patient)

S.N	Patient Name	Patient Number	Patient Address	Patient Phone	Patient Age	Patient Category
1.	Roshan Paudel	IU20S	Pokhara	98765	22	Appt Req

Table 5. 7: Approved Appointment:(doctor)

S.N	Test Input	Expected Outcome	Actual Outcome	Result
1.	First name: Suman Last name: Pun DOB: 12/12/2001 Age:22 Address: Narchyang	Successfully inpatient	Successfully inpatient	Test Success

	Mobile:98765 Patient Aliment:TEST Patient's Type:Inpatient			
2.	First name: Roshan Last name: Paudel DOB: 12/12/2001 Age:22 Address: Pokhara Mobile:98765 Patient Aliment:TEST Patient's Type:Inpatient	Successfully inpatient	Successfully inpatient	Test Success

Table 5. 8:Appointment Status:(patient)

S.N	Patient Name	Patient Number	Patient Address	Patient Phone	Patient Age	Patient Category
1.	Roshan Paudel	IU20S	Pokhara	98765	22	Inpatient

Table 5. 9: Register Patient by Doctor

S.N	Test Input	Expected Outcome	Actual Outcome	Result
1.	First name: Samer Last name: Pun DOB: 12/12/1996 Age:27 Address: Beni Mobile:90234	Register Patient Successfully	Register Successfully	Test Success

	Patient Aliment:NA Patient's Type:Inpatient			
2.	First name: Mohan Last name: Ramjali DOB: 12/11/1990 Age:33 Address: Dana Mobile:98765 Patient Aliment:TEST Patient's Type:Inpatient	Register Patient Successfully	Register Successfully	Test Success

View Patients From Doctor:

<input type="text" value="Search"/>							
#	Patient Name	Patient Number	Patient Address	Patient Phone	Patient Age	Patient Category	Action
1	man maya purja	WZFO9	lamachour-16	9818087377	22 Years	InPatient	View
2	Depak Dhahal	ISL1E	pokhara	7412225698	22 Years	InPatient	View
3	Manika Gurung	4TLG0	pokhara	7412569698	22 Years	InPatient	View
4	Susanth Regmi	3Z14K	sangja	1478885458	22 Years	InPatient	View
5	Jagat Acharya	DCRI8	pokhara	1458887854	22 Years	InPatient	View
6	Roshan paudel	IU20S	pokhara	1234567890	23 Years	InPatient	View
7	Ankit Pageni	KU8W4	sangja	1458889655	22 Years	OutPatient	View
							« « 1 2 » »

5.2.2. System Testing:

System testing is a level of testing that validates the complete and fully integrated software product. The purpose of a system test is to evaluate the end-to-end system specifications. System Testing is a series of different tests whose sole purpose is to exercise the full computer-based system.

i) White box testing:

This type of testing involves analyzing the internal structure of the software. In our project, we can perform white box testing on the modules like patient, doctor, and admin. White box testing helps identify the logic errors, control flow errors, and boundary value analysis errors.

ii)Black box testing:

This type of testing involves testing the software without knowing its internal structure. In our project, we can perform black box testing on the user interfaces of the modules like patient, doctor, and admin. Black box testing helps identify the functional errors, input-output errors, and boundary value analysis errors.

Table 5. 10: Black Box Testing

S.N	Expected Result	Actual Result	Result
1.	Login Admin, Doctor, Patient	Success	Pass
2.	Request/Response Appointment	Success	Pass
3.	Manage Patient and doctor from Admin	Success	Pass
4.	Manage patient form Doctor	Not delete other Success	Pass
5.	Accounting manage by Admin	Success	Pass
6.	Manage Laboratory by Admin and Doctor	Success	Pass
7.	Manage Pharmacy by Admin	Success	Pass
8.	Manage Inventory by Admin	Success	Pass
9.	Generate Payrolls by Admin	Success	Pass
10.	View Doctor prescription, lab report, vitals form Patient	Success	Pass
11.	View My payrolls only Doctors	Success	Pass

12.	Add prescription, lab report, vitals doctor to patient	Success	Pass
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Chapter 6: Conclusion And Future Recommendation

6.1 Conclusion

In conclusion, Our Hospital Management System stands as a cutting-edge solution, The system not only provides a robust platform for streamlined healthcare management but also ensures a user-friendly experience for patients, doctors, and administrators alike. With secure registration, login, and appointment scheduling for patients, a dedicated portal for doctors, and a comprehensive payroll module, the platform caters to the diverse needs of healthcare professionals. Administrators benefit from a powerful admin panel, enabling efficient oversight of patient details, appointments, and medical records, along with seamless management of various entities such as doctors, vendors, pharmacies, and laboratories. The reporting and analytics feature empowers administrators with detailed insights into patient records, appointment histories, inventory status, and payroll information. With specialized modules for medical records, inventory management, and a dedicated section for surgical/theater operations, Our Hospital Management System emerges as a secure, efficient, and scalable solution, revolutionizing comprehensive healthcare administration.

6.2 Future Recommendation

Additionally, we are actively pursuing further development for Our Hospital Management System, aiming to introduce new functionalities in the future. These include:

- 1. Integration of Insurance:** We plan to incorporate a feature that seamlessly integrates insurance processes into the system.
- 2. Module Separation:** To alleviate administrative overload, we intend to separate modules for accounting, pharmacy, and laboratory, providing focused and efficient management in these areas.
- 3. Payment Gateway Integration:** In the upcoming development phases, we will integrate a secure payment gateway. This enhancement will allow users to make payments for appointments through the system.

4. System for All Hospitals: Our vision extends beyond a single hospital. We are working on creating a system that can be utilized by multiple hospitals, fostering a comprehensive healthcare solution for diverse healthcare settings.

5. Integrate a blood bank system : In the near future, our focus is on enhancing the efficiency of our hospital management system by incorporating a state-of-the-art blood bank system. This integration marks a strategic step towards streamlining and optimizing our healthcare processes. The introduction of a dedicated blood bank system is poised to bring about significant improvements in the way our hospital operates.

These planned functionalities are part of our commitment to continuously improve and expand the capabilities of Our Hospital Management System.

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