

**Aim: Case studies for demonstration of Use-case diagrams:****Description:****1. Library Management System:**

- Use-case diagrams for a Library Management System illustrate interactions between actors (e.g., librarian, borrower) and the system, showcasing functionalities such as borrowing books, returning books, and checking availability. Depicted in fig 1.1.

**2. ATM Bank System:**

- Use-case diagrams for an ATM Bank System outline interactions between actors (customers, bank staff) and the system, showcasing operations such as withdrawing cash, checking account balance, and transferring funds. Depicted in fig 1.2.

**3. Airline Ticketing System**

- In the context of an Airline Ticketing System, use-case diagrams depict interactions between actors (e.g., passengers, airline staff) and the system, highlighting processes like booking flights, cancelling reservations, and managing passenger information. Depicted in fig 1.3.

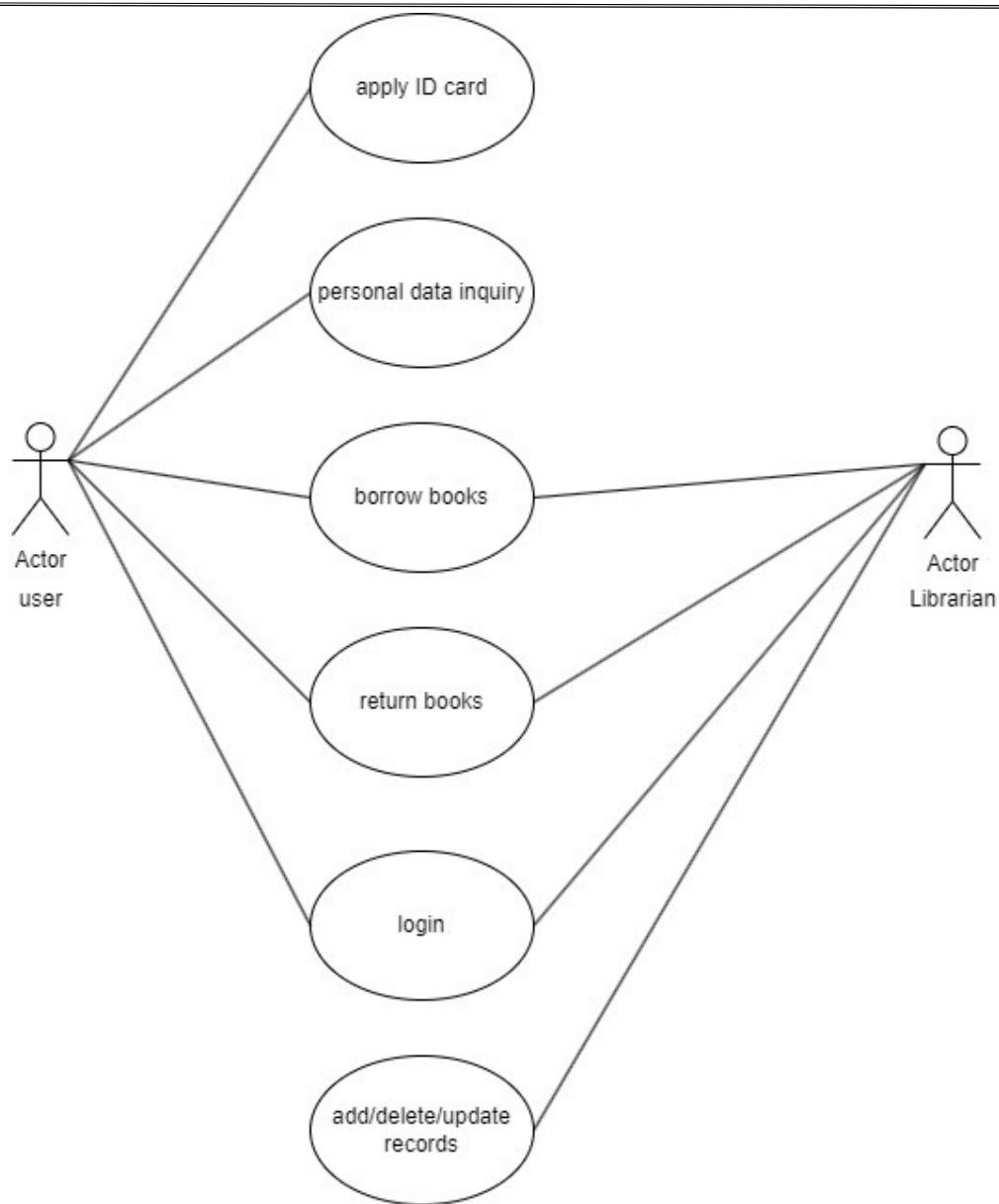


Fig 1.1 Use case diagram for Library management system

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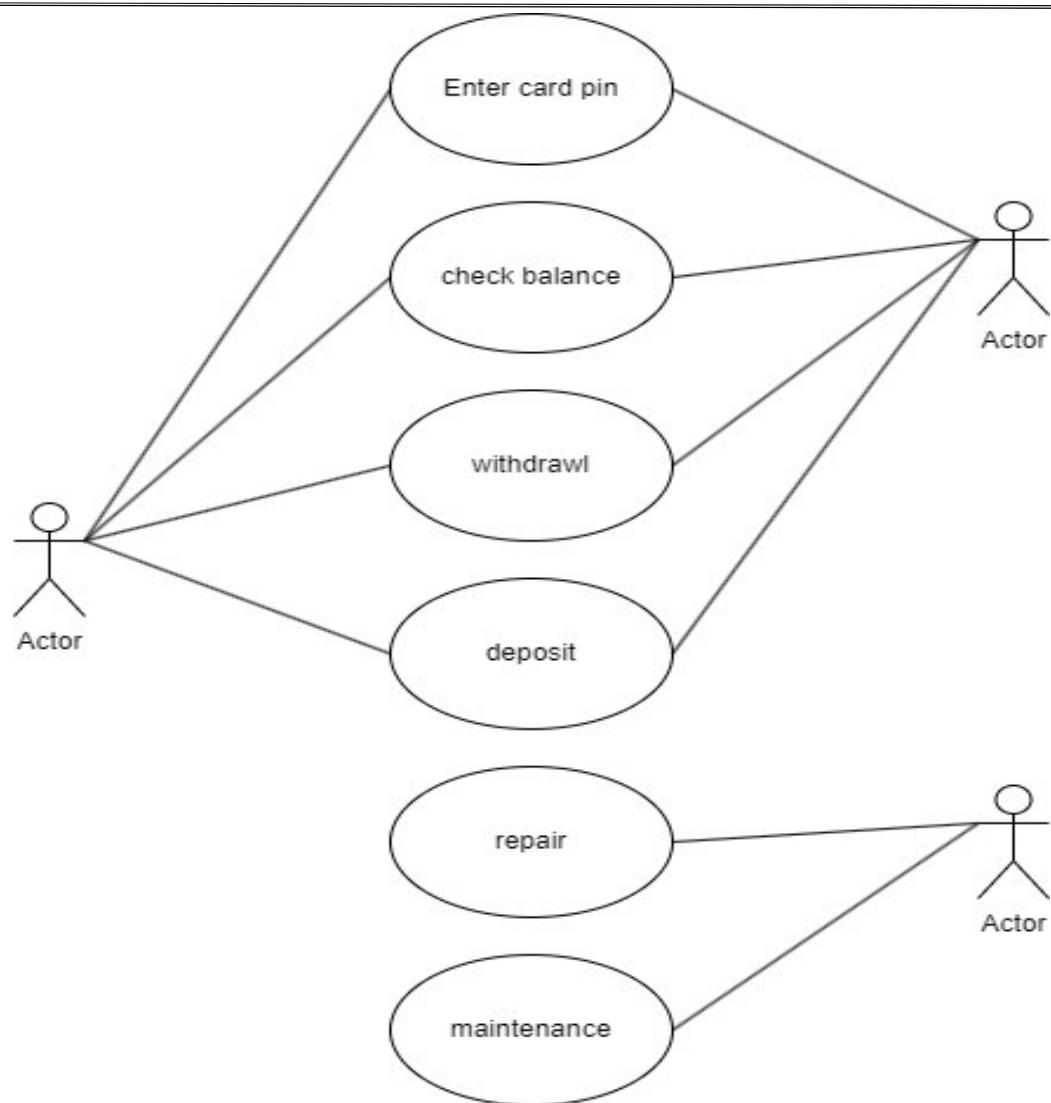
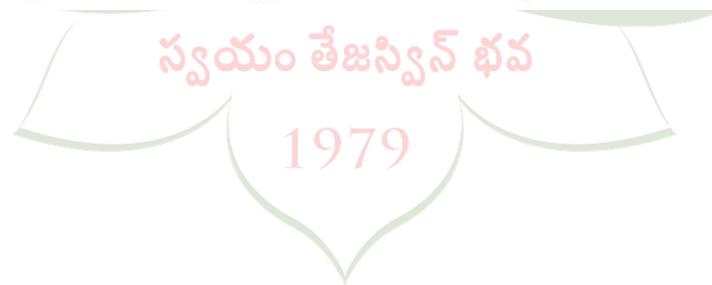


Fig 1.2 Use case diagram for bank ATM system



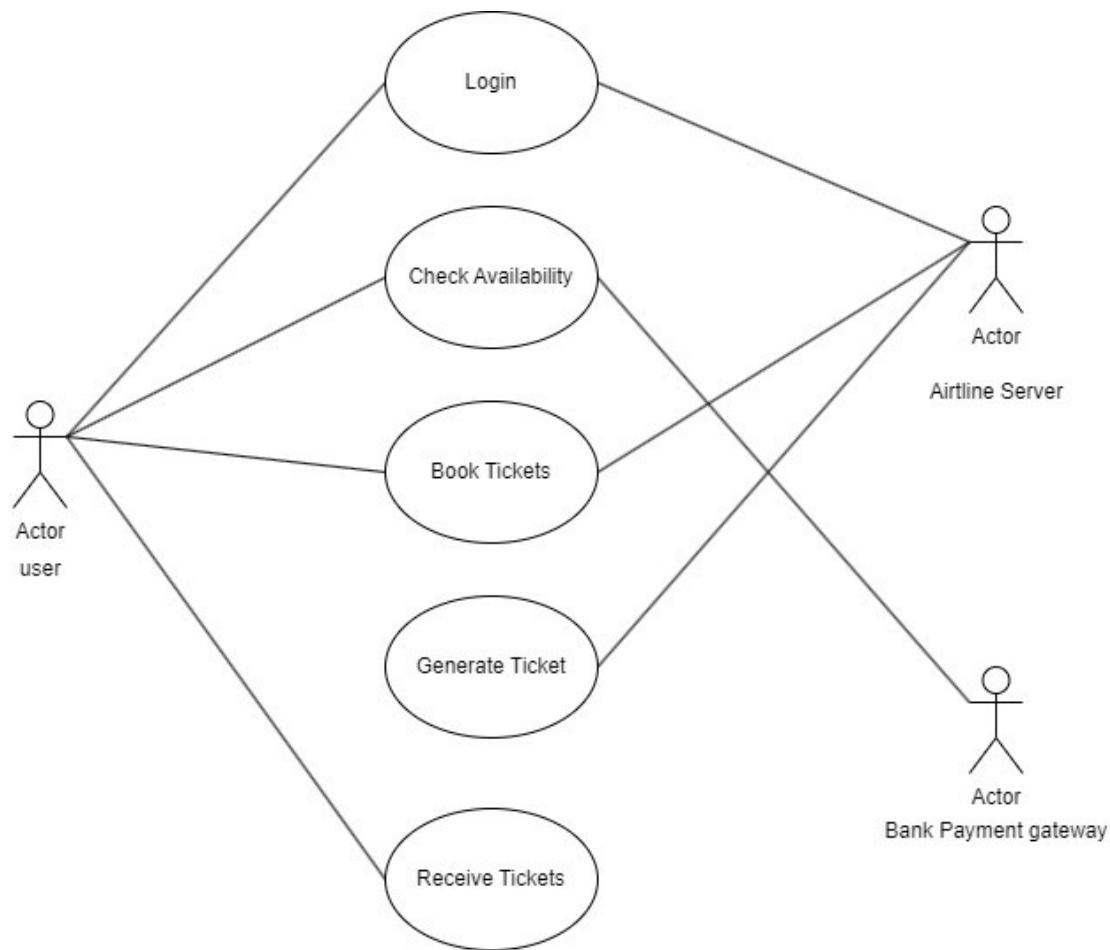
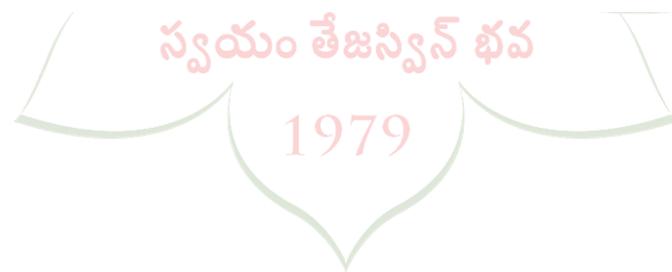


Fig 1.3 Use case diagram for airline ticketing system



## Software requirements specification (SRS)

### HOSPITAL MANAGEMENT SYSTEM

#### SRS Outline:

1. Introduction
  - 1.1 Purpose
  - 1.2 Project Scope
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  - 1.5 Additional information
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2. Overall Description
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4. External Interface Requirements
  - 4.1 User interfaces
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  - 4.4 Communication protocols and interfaces
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  - 5.1 Security requirements
  - 5.2 Performance requirements

5.3 Maintainability

5.4 Reliability

## 6. Other Requirements

Appendix A: Terminology/Glossary/Definitions list

### **1. Introduction:**

My project Hospital Management system includes registration of patients, storing their disease details into the system. My software has the facility to give a unique id for every patient and stores the details of every patient. The Hospital Management System can be used by entering respective username and password. It is accessible either by an administrator or receptionist. Only the respective person can add data in the database. The data can be retrieved easily. The interface is very user-friendly. The data is well protected and data processing is very fast, accurate and relevant.

#### **1.1 Purpose:**

A hospital management system is software designed to manage all the areas of a hospital such as medical, financial, administrative and the corresponding processing of services.

#### **1.2 Project Scope:**

Daily functions like patient registration, managing admission and overall management of various departments can be easily performed with higher accuracy after the installation of hospital software. The modules of hospital management software are user-friendly and easy to access.

#### **1.3 Document Conventions:**

The document is prepared using Microsoft Word 2010 and has used the font type 'Times New Roman'. The fixed font size that has been used to type this document is 14pt and for headings 18pt with 1.5 linespacing. It has used the bold property to set the headings of the document. All pages except the cover page are numbered, the numbers appear on the lower right-hand corner of the page. Every image and data table are numbered and referred to in the main text.

#### **1.4 Intended audience:**

The intended audience of this document would be the client and

specific employees like the Manager and Receptionist, consultants and System Operators of a Hospital, and project team, supervisor with the objective to refer and analyze the information. The SRS document can be used in any case regarding the requirements of the project and the solutions that have been taken. The document would finally provide a clear idea about the system that is being built.

## **1.5 Additional Information:**

Hospital Management System can be used by entering respective username and password. It is accessible either by an administrator or receptionist. Only the respective person can add data in the database. The data can be retrieved easily. The interface is very user-friendly. The data is well protected and data processing is very fast, accurate and relevant. A hospital management system is software designed to manage all the areas of a hospital such as medical, financial, administrative and the corresponding processing of services.

## **1.6 References:**

Available: <http://www.itu.dk/~slauesen/Papers/IEEEtasks.pdf>

## **2. Overall Description:**

A hospital management system is software designed to manage all the areas of a hospital such as medical, administrative and the corresponding processing of services. HMS is an abbreviation of **hospital management system**. The hospital

management system (HMS) is an integrated software that handles different directions of **clinic** workflows. It manages smooth healthcare performance along with administrative, medical, legal, and financial control. That is a cornerstone for the successful operation of the healthcare facility.

### **2.1 Product Perspective:**

This Hospital Patient Management System is a self-contained system that manages activities of the hospital as bed assignment, operations scheduling, personnel management, and administrative issues. Various stakeholders are involved in the hospital system.

### **2.2 Product Features:**

#### **Doctor Module:**

- Add patients report
- Delete patients report
- Display reports
- Give prescriptions.
- Search reports of patient

#### **Receptionist Module:**

- Add patient's data
- Delete patient's data
- Display records
- Refer to different doctors
- Search the record of patients

#### **Patient Module:**

The different functionalities of the module are listed below:

- Search reports
- Search his record

### **2.3 User Classes and Characteristics:**

The system will be used in the hospital. The administrators, front-desk staff will be the main users. Given the condition that not all the users are computer-literate.

Some users may have to be trained in using the system.

### **2.4 Operating Environment:**

The system is also designed to be user-friendly. The software will operate, including the hardware platform, operating system and versions, and any other software components or applications with which it must peacefully coexist.

### **2.5 Design and Implementation Constraints:**

1. Anticipate difficulties and limitations regarding system upgrades and improvements due to the coordination required to stop clinical systems that require continuity of operation.
2. Be able to handle a significant number of transactions at any time.
3. Support a high rate of concurrent electronic transactions as different

- health professionals may have to enter new information or modify it.
4. Always log all transactions to be able to know what happened, allowing you to replay events, understanding bugs and ensuring the integrity of information.
  5. Always ensure the integrity of the information, even in concurrent consultation.
  6. Guarantee a speed of data display, no matter how much information to look for in several different databases.

### **3. Positioning:**

#### **3.1 Business opportunity:**

##### **3.1.1 Improved Processes**

It helps to optimize the user experience. Medical specialists, patients, and hospital authorities can interact online.

##### **3.1.2 Financial control and tax planning**

The management can monitor different financial operations including expenses, profits, and losses, paying bills and taxes, in and outpatient billing. Financial awareness helps to analyze business prospects quite clear and move in the right direction.

#### **3.2 Market strategy**

Due to the high market competitive nature, the medical industry is also open to all the different innovations that enable communication between patients, doctors, suppliers, and marketing services providers.

### **4. External Interface Requirements:**

#### **4.1 User Interfaces:**

Describe the logical characteristics of each interface between the software product and the users. This may include sample screen images, any GUI standards or product family style guides that are to be followed, screen layout constraints, standard buttons, and functions

(e.g., help) that will appear on every screen, keyboard shortcuts, error message display standards, and so on. Define the software components for which a user interface is needed. Details of the user interface design should be documented in a separate user interface specification.

#### **4.2 Hardware Interfaces:**

Describe the logical and physical characteristics of each interface between the software product and the hardware components of the system. This may include the supported device types, the nature of the data and control interactions between the software and the hardware, and communication protocols to be used.

#### **4.3 Software Interfaces:**

Describe the connections between this product and other specific software components (name and version), including databases, operating systems, tools, libraries, and integrated commercial components. Identify the data items or messages coming into the system and going out and describe the purpose of each.

Describe the services needed and the nature of communications. Refer to documents that describe detailed application programming interface protocols. Identify data that will be shared across software components. If the data sharing mechanism must be implemented in a specific way (for example, use of a global data area in a multitasking operating system), specify this as an implementation constraint.

### **5. Non-Functional Requirements**

#### **5.1 Security**

##### **Patient Identification**

The system requires the patient to identify himself /herself using PHN.

##### **Login ID**

Any user who uses the system shall have a Login ID and Password.

##### **Modification**

Any modification (insert, delete, update) for the Database shall be synchronized and done only by the administrator in the ward.

##### **Front Desk staff Rights**

Front Desk staff shall be able to view all information in HPIMS, add new patients to HPIMS but shall not be able to modify any information in it.

##### **Administrators' Rights**

Administrators shall be able to view and modify all information in HPIMS.

## 5.2 Performance Requirements

### Response Time

The system shall give responses in 1 second after checking the patient's information.

### Capacity

The System must support 1000 people at a time.

### User-interface

The user-interface screen shall respond within 5 seconds.

### Conformity

The systems must conform to the Microsoft Accessibility guidelines

## 5.3 Maintainability

### Back Up

The system shall provide the capability to back-up the Data

### Errors

The system shall keep a log of all the errors.

## 5.4 Reliability

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### Availability

The system shall be available all the time

## 6. Other Requirements:

### Appendix A: Terminology/Glossary/Definitions list UML

#### 1. Hospital Patient Information Management System (HPIMS):

- Definition: HPIMS is a comprehensive healthcare information management system designed for hospitals to efficiently organize, store, and manage patient-related data. It encompasses functionalities such as patient registration, appointment scheduling, medical billing, electronic health records (EHR), and

other administrative and clinical operations. HPIMS aims to streamline hospital workflows, enhance patient care, and improve overall healthcare management.

## 2. Health Information Exchange (HIE):

HIE is a system that enables the secure electronic sharing of patient health information among different healthcare organizations and systems. It allows healthcare providers to access and exchange critical patient data, such as medical records, test results, and treatment plans, to support coordinated and patient-centered care. HIE enhances interoperability and collaboration among healthcare entities, promoting more informed decision-making.

## 3. Medical Records:

Medical Records, in the context of healthcare, are comprehensive documents that systematically capture and store a patient's health information over time. These records include details such as medical history, diagnoses, treatments, medications, laboratory results, imaging reports, and other relevant clinical data.

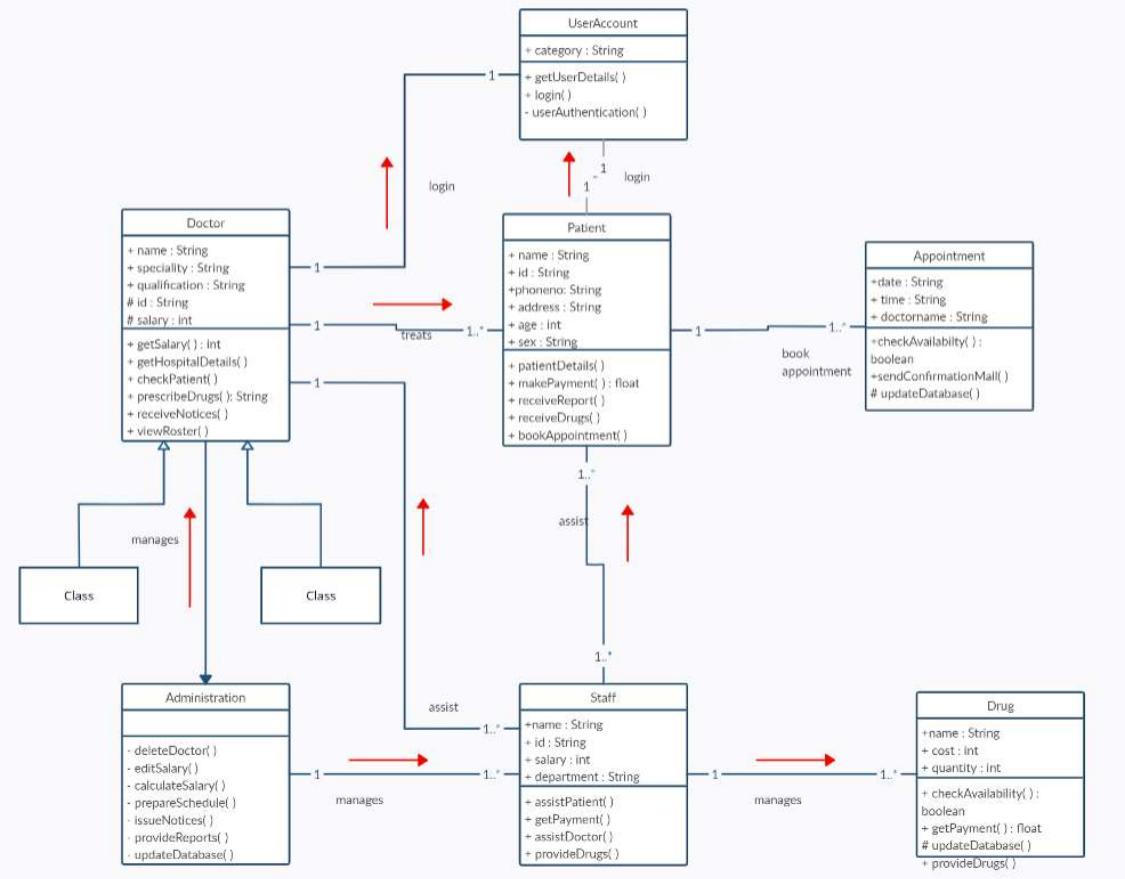


fig 2.1 Class Diagram for Hospital Management System

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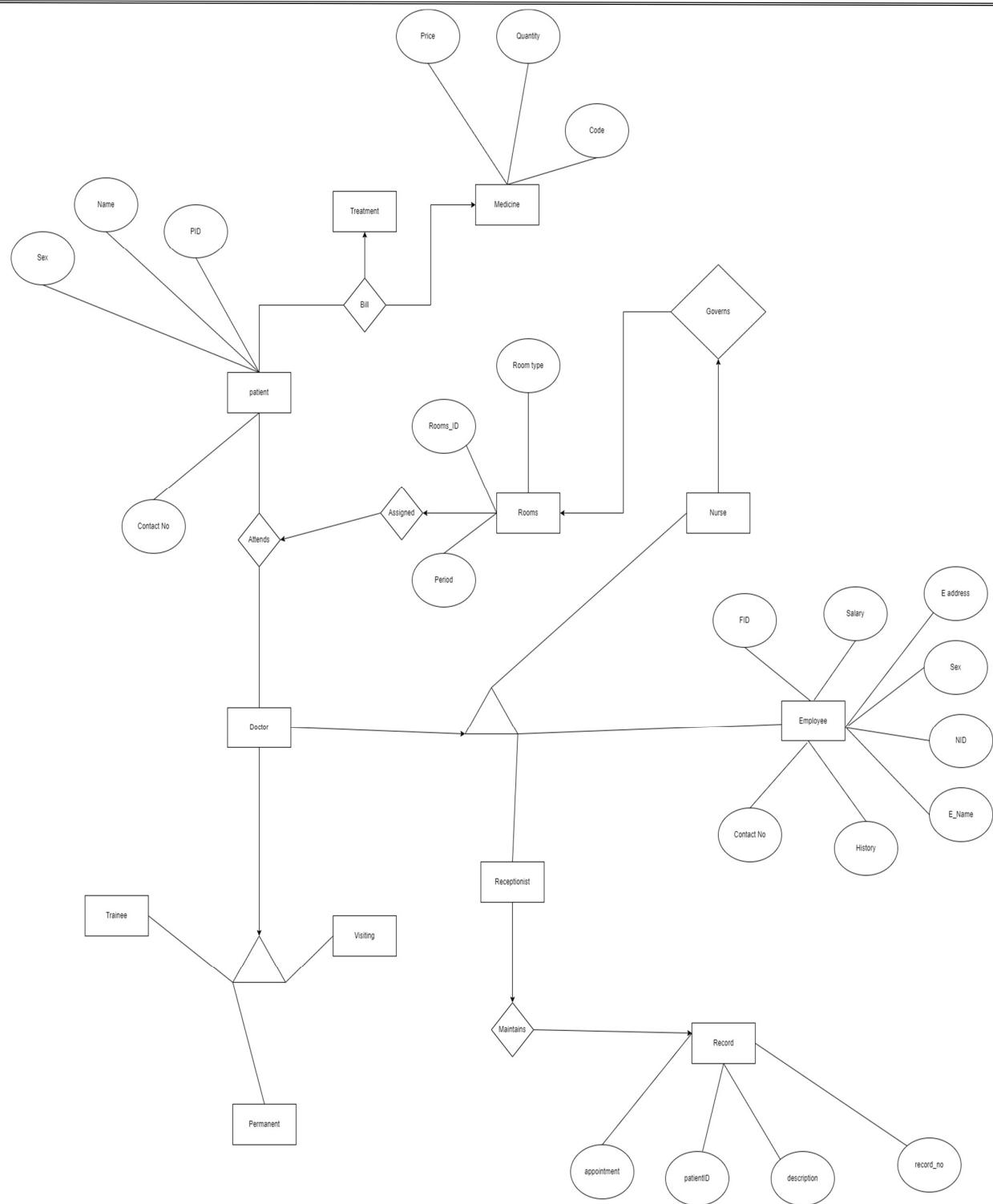


fig 2.2 Entity Relationship Diagram for Hospital Management System

**Aim : To demonstrate Class Diagram for Hospital Management System:****Description:**

A Class Diagram for a Hospital Management System (HMS) represents the static structure of the system, depicting the classes involved and their relationships. A brief description of the main classes in the HMS Class Diagram:

**1. Patient Class:**

Represents individuals receiving medical services.

Attributes: patientID, name, contact details, medical history, etc.

Operations: bookAppointment(), receiveReport(), receiveDrugs(), etc.

**2. Doctor Class:**

Represents medical professionals providing services.

Attributes: doctorID, name, specialization, contact details, etc.

Operations: prescribeDrugs(), diagnosePatient(), getSalary(), etc.

**3. Staff Class:**

Represents non-medical personnel working in the hospital.

Attributes: staffID, name, role, contact details, etc.

Operations: manageInventory(), assistPatient(), etc.

**4. Admin Class:**

Represents administrative staff with higher-level privileges.

Attributes: adminID, name, contact details, etc.

Operations: addDoctor(), deleteDoctor(), generateReports(), etc.

#### 5. Appointment Class:

Represents scheduled appointments between patients and doctors.

Attributes: appointmentID, date, time, patientID, doctorID, etc.

Operations: checkAvailability(), cancelAppointment(), etc.

#### 6. Drug Class:

Represents medications or drugs available in the hospital.

Attributes: drugID, name, dosage, stock quantity, etc.

Operations: provideDrugs(), getPayment(), etc.

#### 7. User Account Class:

Represents user accounts for system access.

Attributes: userID, username, password, permissions, etc.

Operations: authenticateUser(), changePassword(), login(), etc.

Each class has associations with others, reflecting relationships in the system.

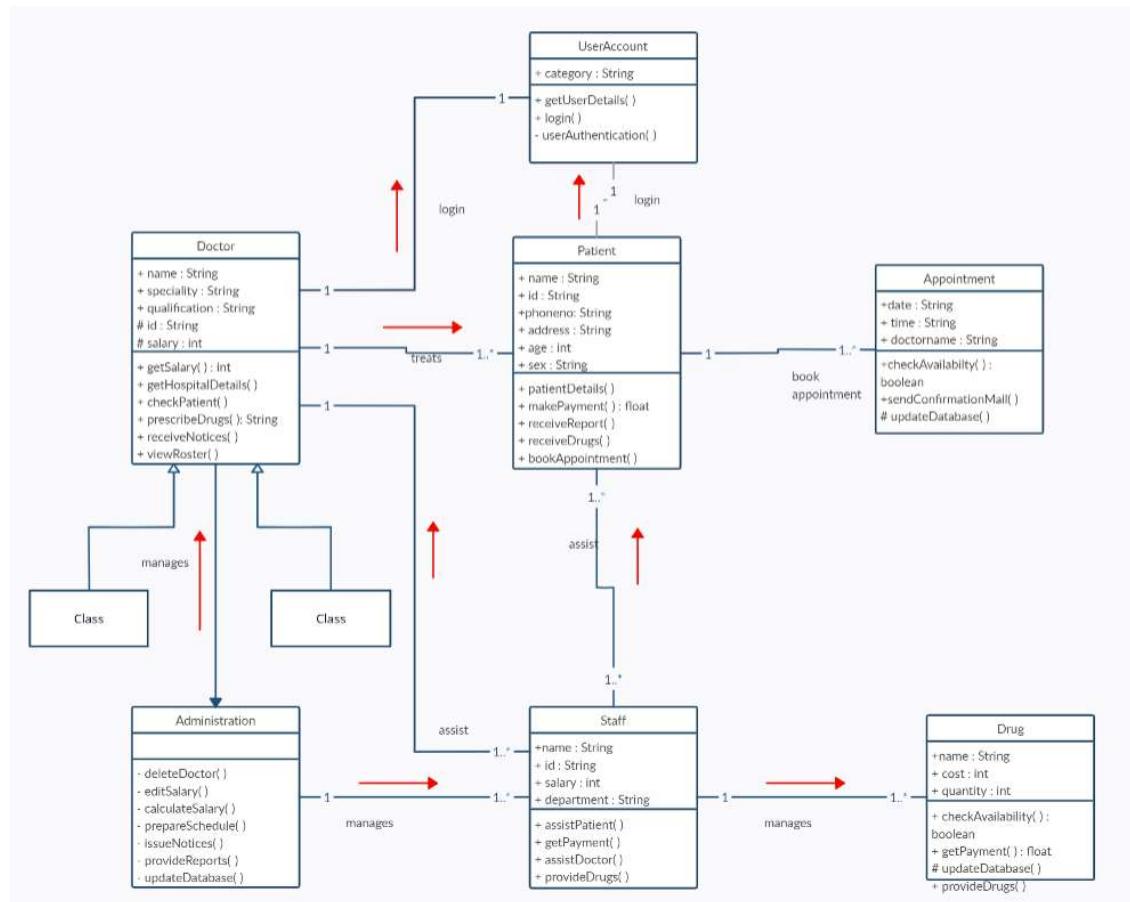
For example:

A Patient may have associations with Appointment, Drug, and User Account classes.

A Doctor may be associated with Patient, Appointment, and User Account classes.

Staff and Admin classes may have associations with various other classes based on their responsibilities.

Associations between classes illustrate how instances of one class are related to instances of another. For instance, a Patient may be associated with an Appointment through a "book appointment" association.



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## DFD for Hospital Management System

### Description:

A Data Flow Diagram (DFD) is a graphical representation of how data flows within a system. Let's describe the Level 0, Level 1, and Level 2 DFDs for a Hospital Management System (HMS):

### Level 0 DFD (Context Diagram):

The Level 0 DFD provides a high-level overview of the HMS, depicting the system as a single process. It illustrates external entities interacting with the system, such as patients, doctors, and administrators. Data flows represent the major processes or data stores, showcasing the overall flow of information in and out of the system.

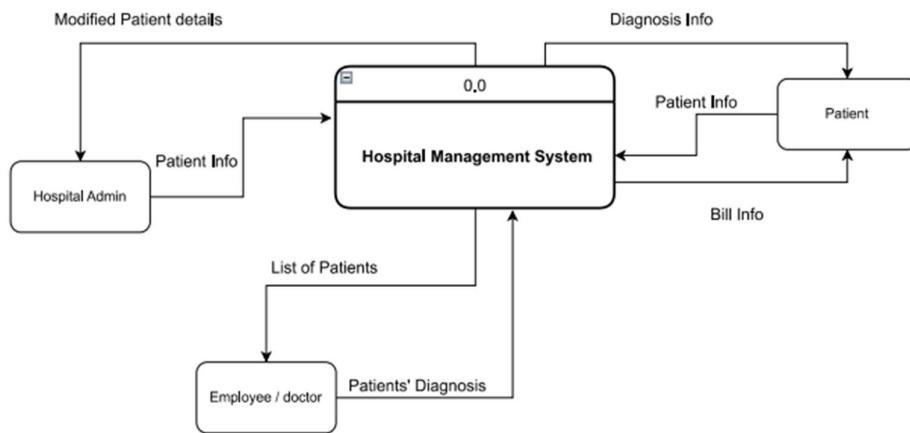
### Level 1 DFD:

The Level 1 DFD breaks down the single process of the Level 0 DFD into sub-processes, revealing more detail. It introduces major functional areas within the HMS, such as Patient Management, Appointment Scheduling, and Billing. Each sub-process is further detailed with its own set of data flows, processes, and data stores. External entities remain present, interacting with these sub-processes.

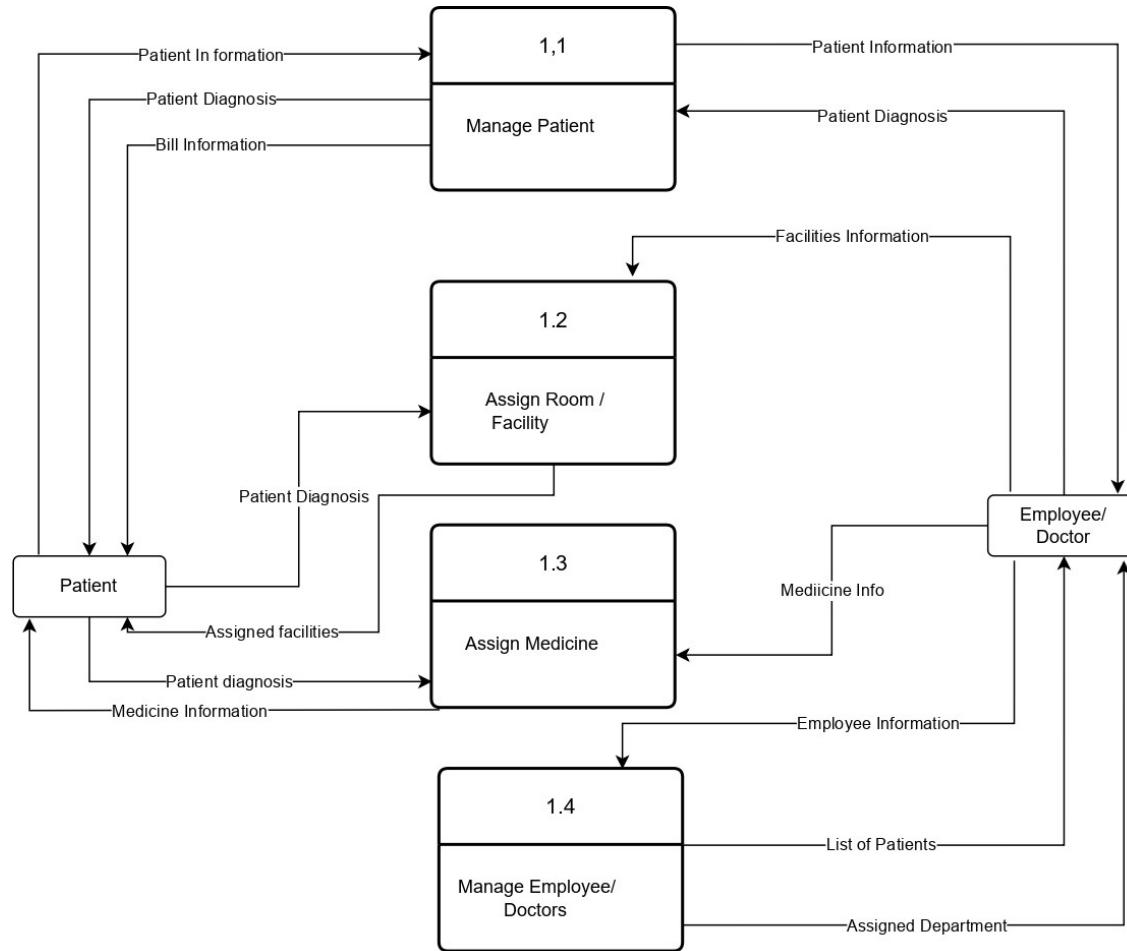
### Level 2 DFD:

The Level 2 DFD dives deeper into specific sub-processes identified in the Level 1 DFD. For example, within the Patient Management sub-process, it may depict detailed processes like Patient Registration, Record Updates, and Admission. Data stores show where information is stored within the system, and data flows illustrate how data moves between processes and stores. External entities, like patients or staff, continue to interact with these more detailed processes.

Level 0:



## Level 1:



## Level 2:

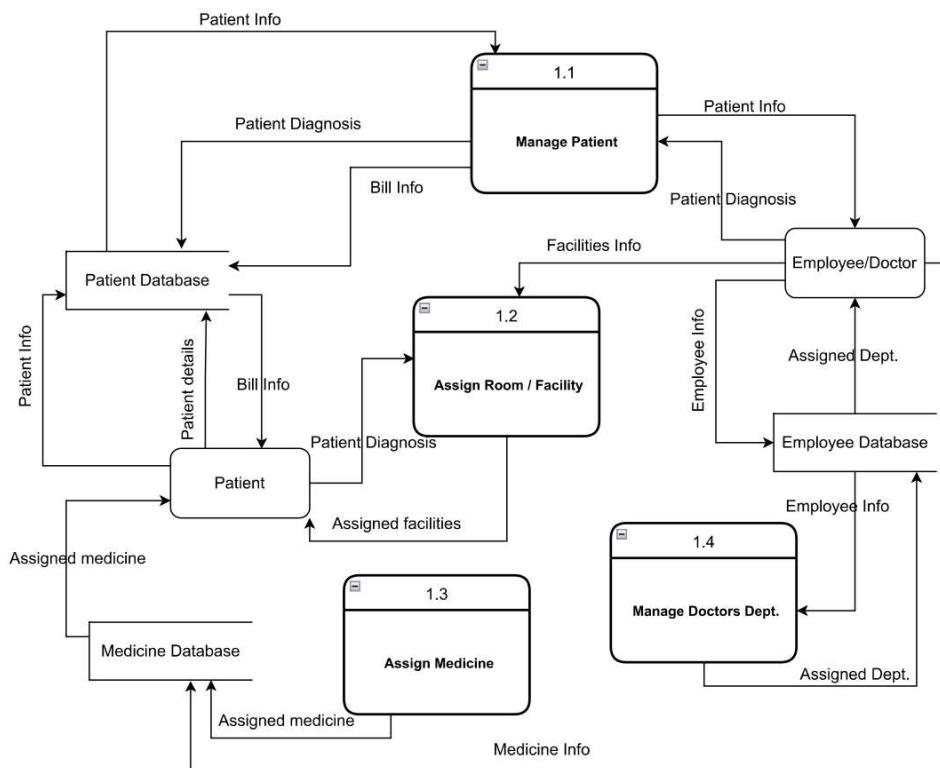


fig 3.3 level 2 DFD

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## Sequence diagram

### Description:

A sequence diagram for a hospital management system illustrates the interactions and communication flow among various components or actors within the system when performing specific tasks or processes. In this diagram, entities such as patients, doctors, nurses, administrators, and the system itself are represented as lifelines. The interactions between these lifelines are depicted through messages and arrows, showcasing the sequence of actions and responses during scenarios like patient admission, appointment scheduling, medical consultations, and record management. The diagram visually outlines how different actors collaborate and communicate to carry out essential functions in a hospital, contributing to an efficient and organized healthcare management system.

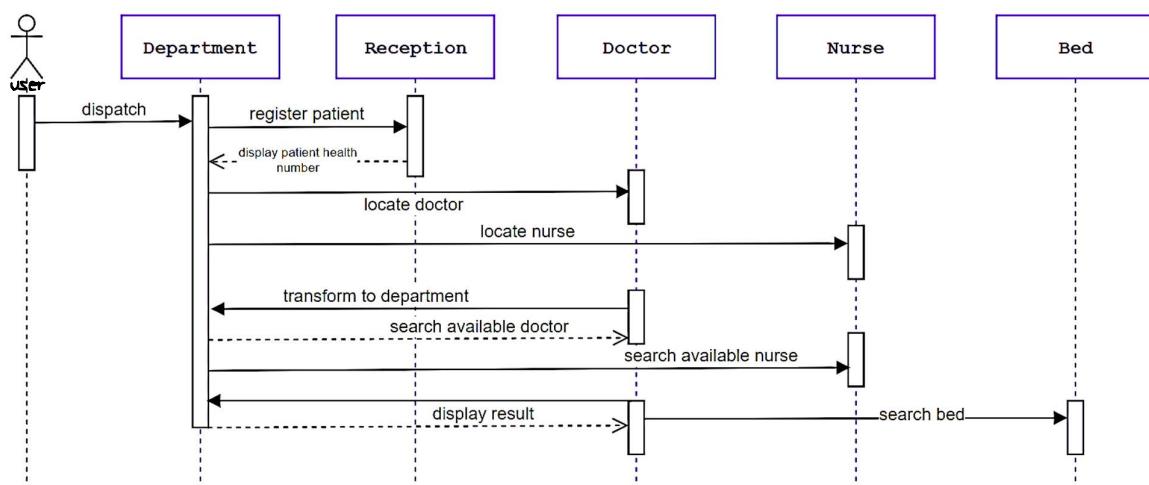


Fig 5.1 Sequence diagram of HMS

## Activity diagram

### Description:

The activity diagram for a hospital management system delineates the sequential and parallel activities involved in various processes, portraying the workflow of entities such as patients, doctors, nurses, and administrators. It illustrates the steps from appointment scheduling to medical consultations, providing a visual representation of the system's operational dynamics and interactivity among different stakeholders.

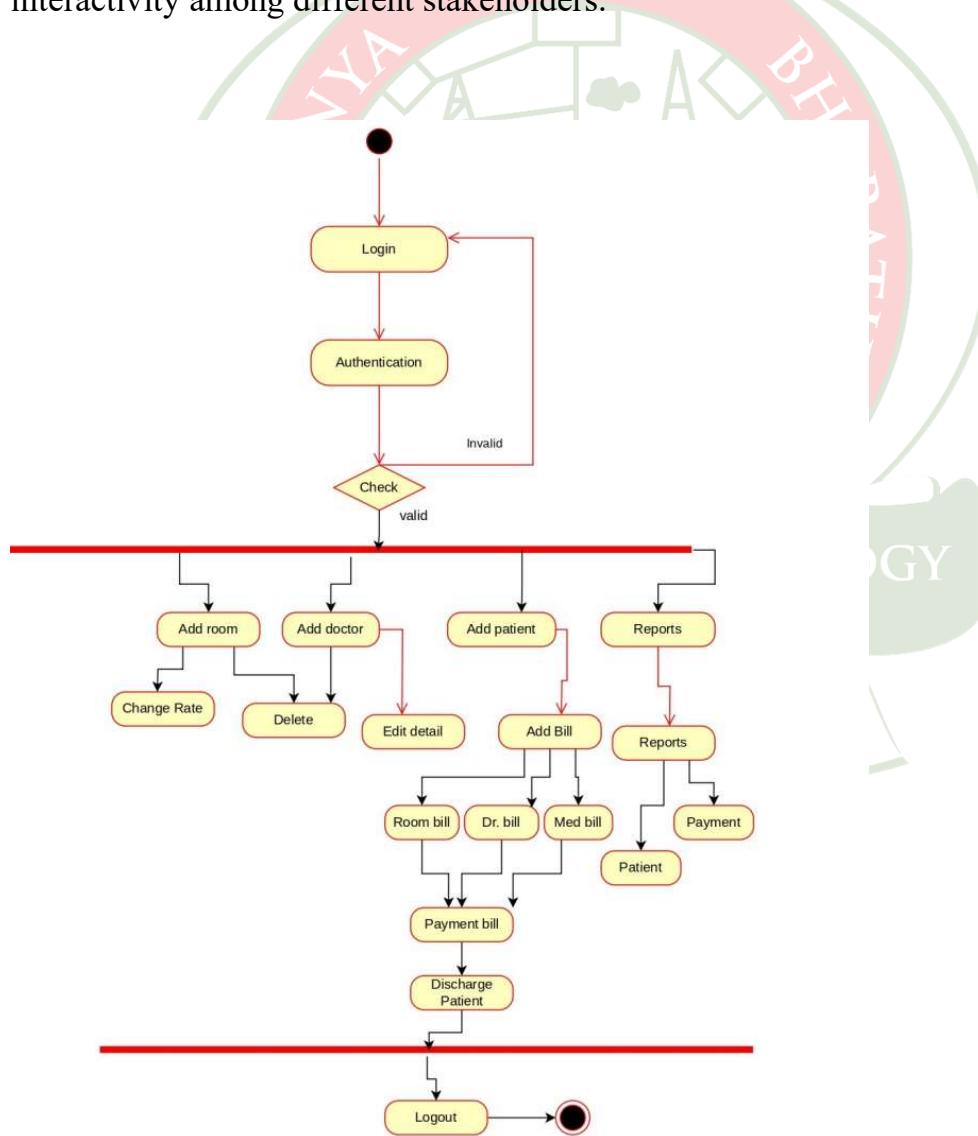


Fig 5.2 Activity diagram of HMS

## State chart

### Description:

A state diagram for a hospital management system depicts the various states and transitions that entities within the system can undergo. States such as "Appointment Scheduled," and "Doctor availability checked" are represented, with transitions indicating the flow between these states. For instance, a patient may transition from the "Doctor availability checked" state to "Consultation attended" after checking in at the hospital. The diagram provides a concise overview of the system's operational states and the events triggering state transitions, offering insights into the lifecycle of activities within the hospital management system.

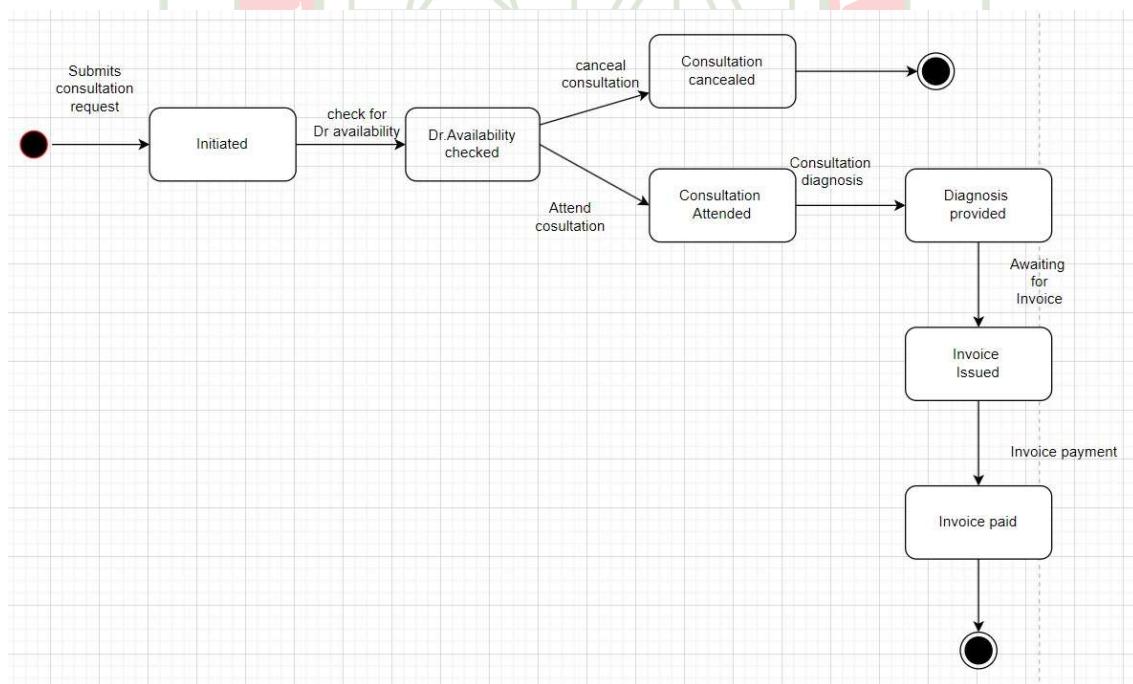
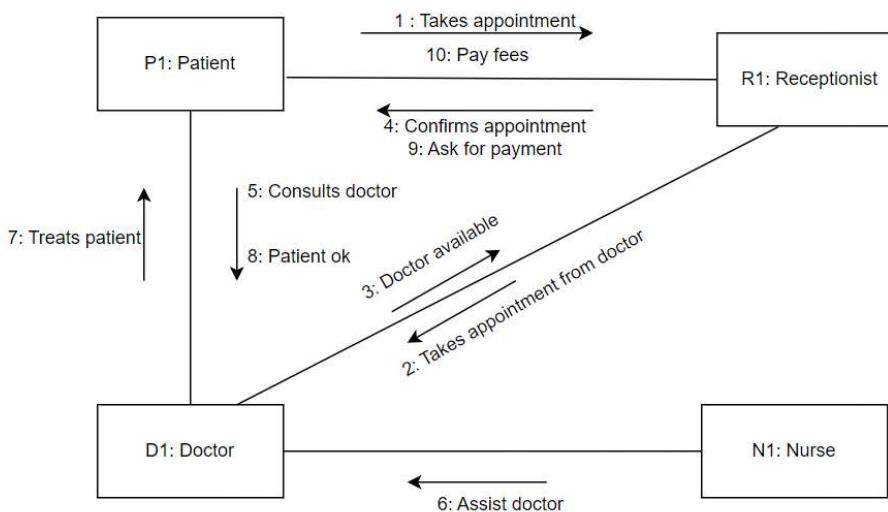


Fig 6.1 State diagram of HMS

## Collaboration diagram

### Description:

A collaboration diagram for a hospital management system illustrates the dynamic interactions and collaborations between objects or entities in the system. Objects, representing instances of classes or components, are depicted as rectangles, and communication between them is visualized using labeled arrows. For example, an object representing a "Patient" may collaborate with an object representing a "Doctor" during a "Medical Consultation" interaction. The diagram highlights the runtime relationships and message exchanges between objects, providing a dynamic perspective on how various elements collaborate to execute specific functionalities within the hospital management system.



*Fig 6.2 Collaboration diagram of HMS*

## Component diagram

### Description:

A component diagram for a hospital management system illustrates the high-level structure of the software components and their interactions. Components, represented as rectangles, embody modular and encapsulated units of functionality, such as "Appointment," "Patient Database," and "Billing System." Connectors between components signify dependencies or associations, indicating the flow of information or control between them. For instance, the "Appointment" component might rely on the "Patient Database" to retrieve patient information. The diagram offers a holistic view of the system's architecture, promoting a clear understanding of the modular design and relationships between key software components in the hospital management system.

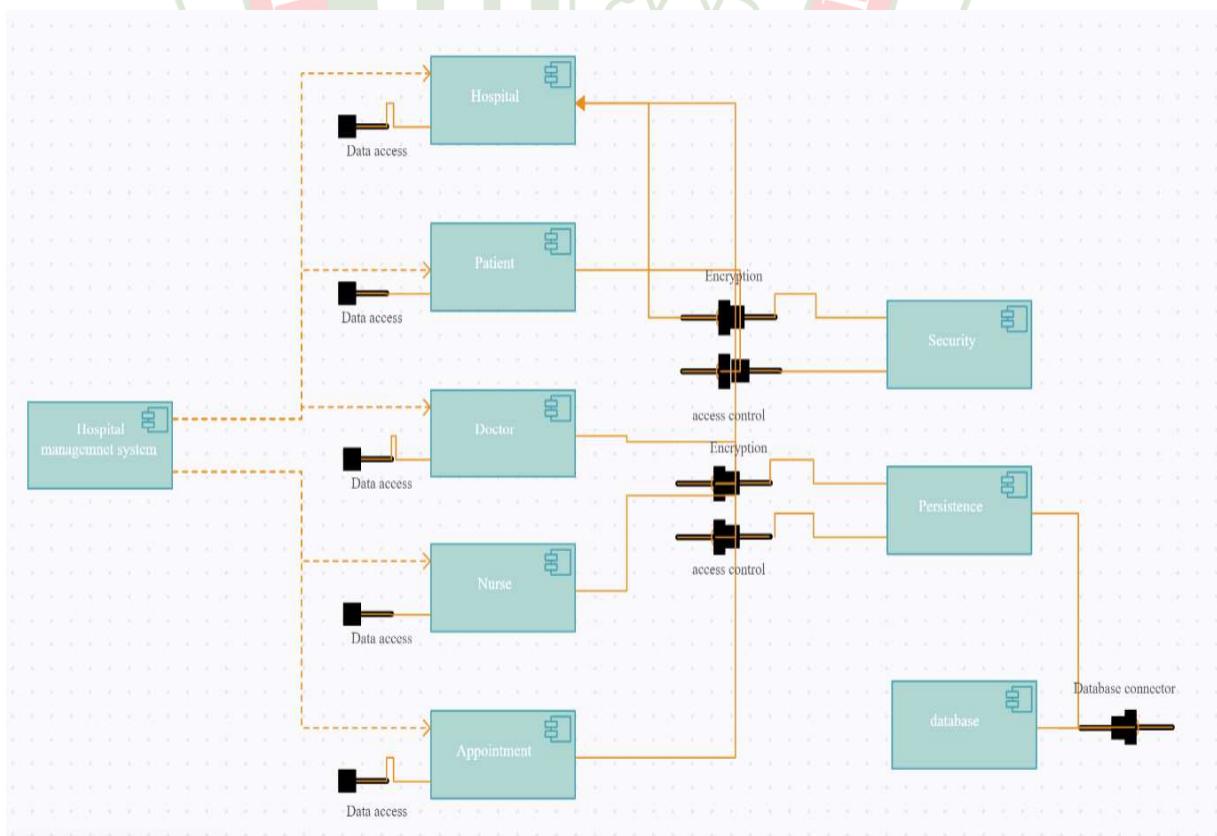


Fig 6.3 Component diagram of HMS

## Deployment diagram

### Description:

A deployment diagram for a hospital management system visualizes the physical distribution of software and hardware components across a network infrastructure. In this diagram, nodes represent hardware devices such as servers, workstations, and databases, while components or artifacts symbolize the software applications and services. Arrows illustrate the connections and deployment relationships between nodes, depicting how the system's components are allocated to different hardware resources. For example, the hospital management application may be deployed on a server, connected to a database server, and accessed by client workstations. The deployment diagram provides a comprehensive overview of the system's architecture, aiding in understanding its distribution across the physical environment.

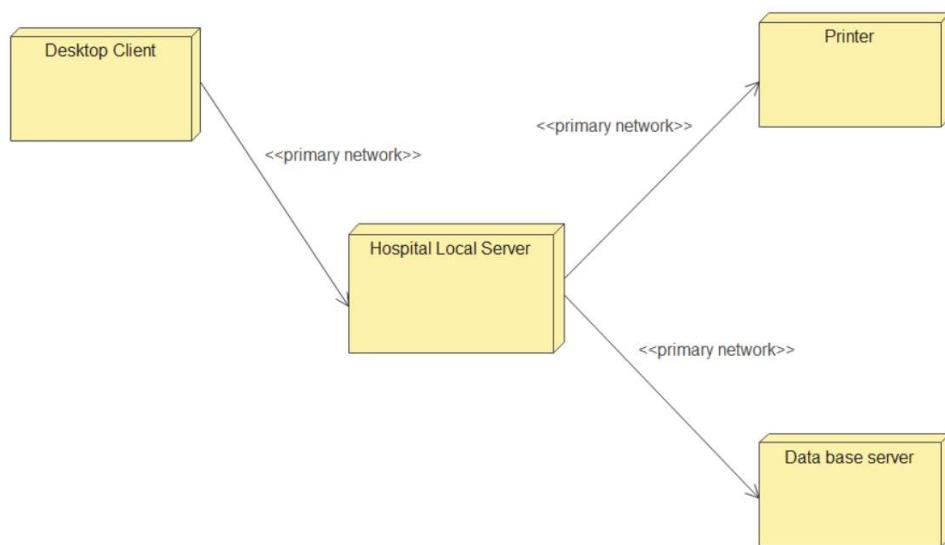


Fig 6.4 Deployment diagram of HMS