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Topic: Upazila Health Complex Management System
Software Requirement & Specification Analysis (SE-406)

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Quality Function Deployment

of Upazila Health Complex

Management System

THE LIST OF STAKEHOLDERS :

1. Patients
2. Medical Officers
3. Resident Medical Officers (RMOs)
4. Consultants
5. Surgeons
6. Nursing Supervisors
7. Ticket Attendants
8. Midwives
9. Nurse
10. Ambulance Driver
11. Store Keepers
12. Pharmacists
13. Pathologists

14. Diabetes medications and vaccine distributor
15. Statisticians
16. Accountants
17. UH & FPO
18. HDL(head clark):
19. DIMS api:
20. Statistics api:
21. Accountant api:
22. Midwives api:
23. Thana api:
24. Sadar Hospital api:
25. Google map
26. Online payment system api
27. SMS api

The list below is the Quality Function Deployment, or QFD, of an Upazila Health Complex management system, aiming to align all the requirements needed for its development. We gathered all these requirements after consulting with all the stakeholders of this system, and organized them into normal, expected and exciting categories.

Normal:

- Patients are able to view the consultant's schedule times.
- Ambulance services can be requested by patients.

- Patients can make appointments for vaccinations and prescription renewals.
- All hospital services are accessible for patients to peruse.
- Patients can have a profile if they want, which will allow them to view prescriptions.
- It will be possible for medical officers to see their schedules.
- The medical officer will have real-time visibility into the availability of indoor beds.
- Medical officers will be able to view the currently available number of beds, based on which they can admit patients in inpatient care.
- The medical officer shall be able to inform the pathologist about the tests that need to be carried out for diagnosis of a patient.
- Patients may be referred to specialists and secondary/tertiary level health care by the medical officer.
- The medical officer can write prescriptions into the system, and the system will forward the prescriptions to the patient's profile.
- By using their patient ID, medical officers can access past reports of patients.
- Medicine availability in the hospital's store can be viewed by the medical officer.
- The storekeepers shall be able to keep track of inventory of medical equipment and supplies.
- Medicine inventory can be tracked by the nurse supervisor.
- The RMO shall be able to manage inpatient, outpatient, and emergency rosters; the doctors then will be informed by the system that they are enrolled in various tasks.

- Medical officers, consultants and nursing staff shall be able to view the rosters through their profile.
- The system will allow the RMO to receive notifications about the number of newborn deliveries and services to the mothers from maternal and child health care units.
- If a death occurs while a patient is receiving inpatient care, the nursing supervisor will notify the RMO via the system.
- RMO will also receive notifications regarding bed availability and nursing staff updates from the nursing supervisor.
- All the employees of the hospital shall have a profile, which will be added into the system by the head clerk.
- Each new employee will have a new profile created by the head clerk.
- The system will have a database that will be managed by the Head Clerk. All the information about old and new employees will be maintained here by him.
- The ticket attendant shall be able to update the database regarding the number of tickets sold to patients, which will be accessed by the accountant.
- The accountant will be able to monitor income and keep track of the money received from patient fees.
- The accountant shall be able to oversee and manage the funding for different workshops and the field workers; for example, spreading awareness about covid-19 and the importance of using face masks.
- The system will aid the accountant in managing the overall budget of the hospital effectively, and send these financial reports to the UHFPO.

- A pharmacist shall be able to order medicines from the store and notify the storekeeper to restock from medicine inventory.
- The system shall automatically generate a report by examining the patient admission, stay and discharge information of the hospital.
- The statistician shall be able to update data of reports for community clinics.
- The nursing supervisor shall be able to modify and update the currently available number of beds in the inpatient.
- The nurse supervisor shall be able to quickly inform medical officers of any emergencies.
- The system will allow the surgeons to observe the current availability of surgical instruments for planned operations.
- The surgeon shall be able to view the Staff availability for the operation.
- A consultant will be able to verify the medication availability and refer patients for inpatient care.
- Diabetes medication and Vaccine distributors will have Real-time vaccine availability checking features.
- The health inspector will be able to send a report to the UHFPO on a regular basis about the food and health issues in the upazila.
- The information of the patients who will be served by the upazila health complex shall be verified first using their NID or birth certificate. If it is a newborn, then the mother's NID / birth certificate will be considered for verification.
- Patients will have an assigned ID based on their verification detail, and the doctor shall issue the quantity and type of medicines to the patient ID. The "diabetes, pressure medications or vaccine distributor" shall only be able to

distribute those medications in the specified quantity as referred by the doctor. The issued medicines shall be added to the patient's profile and shall simultaneously be deducted from the medicine stock.

- The registered patients can buy tickets to gain access to indoor, outdoor or emergency services. They will be transferred to an online payment system to pay and confirm ticket purchase. A code shall be included in the ticket with which the patients shall be able to access the services.

Expected:

- RMO can view dashboard and analytics of stuff in the store and financial records of all departments, employees.
- The system will have a user login interface. Patients can create their own profile if they want .
- The system will be integrated with an existing application for midwife, allowing to keep track of the number of newborn deliveries.
- The head clerk will initially receive an account, after which he or she will add the other health complex employees.
- Patients can use their phone numbers as login credentials to access their accounts.
- Prescriptions can be viewed by patients through one such service after login.
- An effective patient intake and referral procedure is made possible by the system.
- The nursing supervisor might receive a token from the medical officer through the system to admit a patient in inpatient care.

- The consultant can have real-time access to laboratory staff availability.
- Nursing supervisor will have streamlined communication channels with nursing staff.
- The pathologist can be get notified and communicate in real-time with the medical officer.
- If any employee requests for vacation and the UHFPO grants it, all the rosters will be automatically modified.
- HDL will have a streamline communication channel with UHFPO.
- System can generate stock levels reports for medications and medical equipment.

Exciting:

- The patient can get medicine and vaccine reminders based on their prescription.
- The system will be able to access the DIMS app .
- Consultant will have a referral system with district hospital
- The system will alert the storekeeper when the stock is low and will automatically send a request for restock to the district hospital.
- If any employee requests for vacation and the UHFPO grants it, all the rosters will be automatically modified.

- The patients can check the current position of the ambulance they requested for from their location on a map.
- Medical officers can inform about suspicious cases to thana .
- Automatic nearest upazila health complex Identification and shows the path

USER STORY

The Foundation of Bangladesh's Rural Healthcare System Upazila Health Complexes play a crucial role in Bangladesh's healthcare system by offering residents of outlying areas access to basic medical treatment. They play a vital role in providing primary healthcare and are frequently the initial point of contact.

UHCs provide a variety of services, including emergency care, maternity and child health, family planning, inpatient and outpatient treatment, and basic diagnostic capabilities. They may also keep essential medications on hand and provide them to patients at a reduced cost or even without charge, depending on availability. There is an Upazila health complex in each Upazila (sub-district). Upazila Health Complexes (UHCs) bring healthcare closer to the areas where it is most needed, enabling them to serve a population that is geographically dispersed. As of right now, Bangladesh has 435 upazila health complexes, according to the DGHS. They regularly provide healthcare assistance to inhabitants of rural and suburban areas. The Bangladeshi government, however, is working toward a digital vision for 2041 that encompasses a number of goals, including the safe management of health information, digitization of patient records, enhanced prenatal and pediatric care, creation of sustainable health financing, expansion of primary healthcare services, advancement of health literacy, facilitation of telemedicine, and management of non-communicable diseases. With the exception of telemedicine, all of these are somehow tied to the Upazila Health Complex. Managing the Upazila Health Complex is a difficult endeavor. so automation is required.to fulfill the objectives stated in the government's Vision 2041. Our analysis of the existing systems has led us to develop a number of concepts that will help build an automated system that will make it easier for everyone associated with the Upazila Health Complex—from patients to administrative services—to accomplish duties .

Upazila health complex Identification:

At first, the app will request access to the phone's location. If the user gives the app the access to their phone's location, the app will automatically select the nearest Upazila Health Complex and show its corresponding information to the user; otherwise, the user will be asked to select an Upazila Health Complex manually from a list.

Login and Registration System:

Registration of the head Clerk:

At the time of deploying the app, the system developers will add the head clerk of each upazila health complex.

Registration of the employees:

The Head Clerk will add all the employees of their Health Complex using dghs code number of the employee, email, phone number, NID number, joining date and a temporary password as the credentials. The system will fetch the user's personal information from the NID server and complete the registration. Employee can login to the system using their employee ID provided by DGHS.

Registration of the patient:

A patient will use name, age, sex, address, mail/phone number and password(NID/birth certificate mandatory) to register themselves to the system.Newborn will be served by their mother's NID/birth certificate.

After registration the system will provide a patient ID.

Authentication:

Any user who has an account can login to the system with their phone number and password.They can save their sign in details if they want.

Password Recovery:

If any user forgets their password, they can request an OTP code to the number they have given to registration information and change password using that code.

Change Password:

After logging into their account , each user can access their profile where they will have an option to change password.

Patient Care Coordination System:

→ Without having an account, the patient can have access to the following services-

Consultancy time Viewer:

Patients can effortlessly check the schedules of consultants, providing them with the necessary information for scheduling appointments and planning their medical consultations efficiently.

View hospital services:

Patients can explore a wide range of hospital services, including specialized treatments and additional facilities like labs and pharmacies, providing them with comprehensive healthcare options.

Ambulance Call and Live Ambulance Tracking:

During emergencies, patients can use the system to promptly call for an ambulance. To improve emergency response, the system shall integrate with Google Maps allowing patients to pinpoint their location and share it with dispatched ambulances. The ambulance crew's navigation system (upazila health complex app) will then display turn-by-turn directions, while optionally, patients can track the ambulance's general vicinity for improved transparency.

→ If a patient has an account he will get the following services as well-

Efficient Patient Care and Medication Management:

Patients receive personalized medication prescriptions linked to their unique ID which is created upon verification. The medications are distributed in specified quantities, as prescribed by the doctor, provided by pharmacist & diabetics medications and vaccine distributor with real-time updates to patient profiles and stock levels. Convenient reminders for medicine and vaccine reminders from the system based on their prescription, prescription renewals and vaccinations help patients maintain consistent treatment and overall health.

Renew vaccinations and prescription:

Patients receive reminders and renew vaccinations and prescriptions conveniently, staying up-to-date with healthcare needs.

Medicine Reminder:

The patient can get medicine and vaccine reminders from the system based on their prescription, helping them stay consistent with their treatment and improve overall health management.

Medical Test Report & prescription Viewer:

Patients can securely access and review their medical test reports and prescriptions through the system.

E-Ticket Service:

The registered patients can buy tickets to gain access to indoor, outdoor or emergency services. They will be transferred to an online payment system to pay

and confirm ticket purchase. A code shall be included in the ticket with which the patients shall be able to access the services.

Physician-centric Healthcare Management System

Roster Management:

This app streamlines roster management for both RMOs and UHFPOs. RMOs can create and modify staff schedules within the app, ensuring clear communication and visibility of working hours for all medical officers. Medical officers will be notified 3 hours before his roasting schedule. The system automatically sends notifications to medical officers whenever the roster changes. Additionally, UHFPOs can efficiently manage leave requests submitted through the app, granting approval or denial to absent medical officers and the roster will be automatically updated. This automation ensures everyone stays informed and facilitates a smooth workflow within the healthcare system. RMO can manage a roster of nurses and nursing supervisors.

Indoor Management:

The medical officer can view the number of beds that are currently available and send the nursing supervisor on duty an e-token number to admit the associated patient to inpatient treatment. Nursing supervisor can admit patients according to token and update the bed availability. Nursing supervisor can update mortality counts if any patient dies.

Real Time communication:

Medical officers and nursing supervisors can have real-time communication. The pathologist/lab technician and medical officer communicate in real time. Furthermore, medical officials place direct orders for diagnostic testing, and the pathology department receives these orders with ease.

Medicine Inventory Integration:

Before writing a prescription, medical officers can check the medicine inventory (store) to see what medicines are now available.

Reporting Suspicious Cases:

Medical officers can report suspicious medico legal cases directly to the police station through the system.

Surgeon Service:

Surgeons can check the current availability of surgical tools as well as the availability of relevant staff (such as nurses and anesthesiologists) for scheduled procedures and the system will automatically inform the staff who are assigned for a surgery. They can refer patients to Sadar hospital.

Patient Information Management:

Medical officers can search for patients using their IDs and access their complete medical history, including past reports, for diagnosis and treatment planning. Surgeons, Nursing supervisor, consultant can also

access this information for pre-operative assessment and planning. Doctor's Id will be provided with the prescription.

Electronic Prescription:

Medical officers and Consultant create electronic prescriptions with prescription serial ID for patients. Prescriptions are instantly associated with the patient's profile upon creation to facilitate quick access and medication adherence.

Referral System:

Medical officers can access information on specialists and services available at secondary or tertiary facilities, and electronically transfer a patient's medical records to the chosen referral center.

Streamlined access to drug information:

Doctors (M.O, Consultant) can search for medications by name, brand, or generic equivalent on DIMS API. Access comprehensive data sheets with up-to-date information on indications, dosages, contraindications, drug interactions, and potential adverse effects. Highlight critical warnings and safety considerations for each drug, including allergies, interactions with specific foods or supplements, and potential side effects based on patient demographics (e.g., pregnancy, age).

Healthcare Personnel Support System:

Inventory management:

By enabling Storekeeper, RMO, UHFPO to digitally track and manage medical supplies, equipment, and prescriptions, the app will simplify inventory management procedures. This includes tools for restocking supplies, tracking of stocks, and automated notifications for low stock levels to district reserve stores(DRS) in civil surgeon offices.

Tracking newborn deliveries and maternal care:

Midwives will have the ability to seamlessly track newborn deliveries and maternal care provided through an integration with their existing app. This functionality will allow them to update the number of deliveries conducted and mothers served directly within their familiar workflow. The updated data will then be securely transferred to this healthcare app.

Automated restock request:

The system shall automatically generate restock requests for the district hospital when inventory levels for any item fall below a predefined threshold set by the storekeeper. This notification, triggered by the inventory management system integration, will include item details, current stock level, and restock threshold. The storekeeper can also manually trigger requests and adjust thresholds based on real-time data and historical usage patterns. The system should handle notification failures and provide logs for restock request history, ultimately optimizing communication and inventory management for the healthcare organization.

Administration Service:

Checking availability of staff and resources:

A section of the app will be dedicated to checking the availability of doctors ,nurses , support staff and required supplies, including prescribed medications, medical equipment, and other equipment. This ensures that there are no shortages or outages and that the health complex runs efficiently. It will be managed by UH&FPO.

Employee Data Management:

The Employee Data Management feature empowers Head Clerks to manage employee information efficiently. Head Clerks can seamlessly add new employees to the system, capturing essential details like contact information, emergency contacts, and job titles. This centralized database serves as a secure repository for all employee records, eliminating the need for scattered files or spreadsheets. Authorized personnel can easily access and update employee information as needed, ensuring data accuracy and consistency. The system also offers functionalities for managing employee onboarding documents, and generating reports for payroll or other Head clerk's purposes. This comprehensive approach simplifies Head clear tasks, reduces administrative overhead, and fosters a well-organized employee data management system.

Ticket Sales Database Management:

The Ticket Sales Database Management feature empowers ticket attendants to efficiently track and record daily sales across various departments within the healthcare facility. Ticket Attendants can easily update information on tickets sold for indoor clinics, outdoor services, and emergency healthcare departments directly within the system. This centralized database provides real-time insights into sales trends, allowing statisticians to analyze departmental performance, identify peak periods, and optimize resource allocation.

Accounting Management:

This feature empowers accountants to effectively monitor and manage the financial health of the healthcare organization. Accountants can leverage the system to track and analyze monetary disbursements across all departments. This comprehensive view allows for informed decision-making regarding resource allocation, budgeting, and cost optimization. Furthermore, the system facilitates seamless communication with UHFPOs by enabling accountants to directly generate reports and notifications regarding departmental monetary allocations. This real-time financial transparency empowers UHFPOs to make informed choices about departmental spending and program development, ultimately leading to improved financial accountability and efficient resource utilization.

Enhanced Statistical Analysis of all sectors:

Statisticians can delve into a vast repository of departmental data encompassing staffing, resource utilization, patient demographics, and treatment outcomes. Interactive dashboards and advanced statistical modeling tools allow statisticians to identify trends, predict

future resource needs, and assess the effectiveness of healthcare interventions. By generating customizable reports for stakeholders across departments, this feature empowers data-driven decision making to optimize resource allocation, improve service delivery, and ultimately achieve better patient outcomes.

UH&FPO's Dashboard:

The UH&FPO (Upazila Health and Family Planning Officer) Dashboard offers a centralized hub for real-time healthcare operations management. UH&FPOs can monitor staff rosters, track on-duty doctors, and oversee departmental budgets and resource allocation, all within a single platform. Additionally, the dashboard provides real-time updates on medicine inventory, nursing supervisor activities, empowering UHFPOs to make data-driven decisions for optimized resource allocation, and ultimately, better healthcare delivery across their Upazila.

Data-driven outbreak prediction:

The system will receive statistical information regarding time, occurrence and type of outbreak in an area from the IEDCR website and pass on the relevant information to the UHFPO. The system will also process the received data and make predictions of possible outbreaks in that area. This will help UHFPO to decide what actions need to be taken to control any outbreaks in the future.

This user story outlines the key functionalities within the upazila hospital complex management system. To further detail the interactions between the users and the system, a use case diagram has been created to illustrate the specific steps involved and the system's responses. This will ensure a clear understanding of how this user story translates into practical actions within the system.

Requirements Modeling

In software development projects, requirements and solutions are continuously altered through teamwork and collaborative efforts through a technique called requirements modeling. Relatively accurate representation of requirements is achieved by requirements modeling, which combines text and diagrammatic representations.

Scenario Based Modeling:

One of the sub-stages of requirements modeling is scenario-based modeling. Since it specifies the main use cases for the proposed software system or application, it is often the first stage of requirements modeling. Later stages of requirements modeling will relate to these use cases. The software team will be better equipped to accurately identify needs and create useful analysis and design models if we comprehend how end users (and other players) desire to engage with a system.

Use Case Diagram:

A use case diagram is a tool for summarizing information about a system and the users within it. It is typically displayed as a graphic representation of how various system components

interact with one another. Use case diagrams will detail the system's events and the order in which they occur, but they do not go into detail on how those events are carried out. An approach for identifying, outlining, and organizing system requirements is called a Use Case. The word "system" here refers to a thing that is being created or run, like a website for mail-order product sales and services. The application's 26 system or subsystem is modeled using the diagram. A use case diagram encapsulates a certain specification. UML (Unified Modeling Language), a standard language for the modeling of real-world objects and systems, uses use case diagrams. Use case diagram is comprised of different symbols and notations which are included as follows.

Actors:

Actors are the users who communicate with a system. They may be a person, group, or external system that communicates with your system or application. They must be external data-producing or data-consuming objects. In the use case diagram, stick figures denote the actors employing the use cases. Actors are also divided into two parts:

Primary Actor: Primary actors collaborate to accomplish necessary system functions and produce the system's desired requirements. They often and directly collaborate with the software.

Secondary Actor: A secondary actor is a person, business procedure, or application that gives a use case a certain outcome or information in order to accomplish the use case's ultimate objective. Secondary actors support the whole

system for fluent execution of primary actors. And they accomplish this task by producing or consuming information.

Associations:

Associations are depicted through a line between actors and use cases. It's quite important because when the diagram becomes complex, associations help to understand the association between actors and use cases

System:

System means a certain pattern of actors' behaviors and interactions. The system is also titled Scenario. In the diagram, a box is used to represent the system scope to use cases. The use case outside the box is considered out of the system's scope.

Module:

All of the use case components are gathered within a single UML shape. This module is also signified as a file or folder.

Use Case Scenarios

Name: Upazila Health Complex Management

Level 0:

Primary Actors:

1. Patients
2. Medical Officers
3. Resident Medical Officers (RMOs)
4. Consultants
5. Surgeon
6. Nursing Supervisors
7. Midwives
8. Ambulance Driver
9. Store Keepers,
10. Statisticians,
11. Accountants,
12. UH&FPO
13. HDL(head clark)

Secondary Actors:

1. Ticket Attendants.
2. Pathologists.
3. Anesthesiologist.
4. Midwives api
5. Thana api
6. District reserve store.
7. Google map

8. Statistics api
9. DIMS api
10. IEDCR api
11. Pharmacy
12. Store

13. Sadar Hospital API
14. Online Payment System
15. Pharmacist.
16. Nurse.
17. Diabetes Medication and Vaccine Distributor
18. SMS service

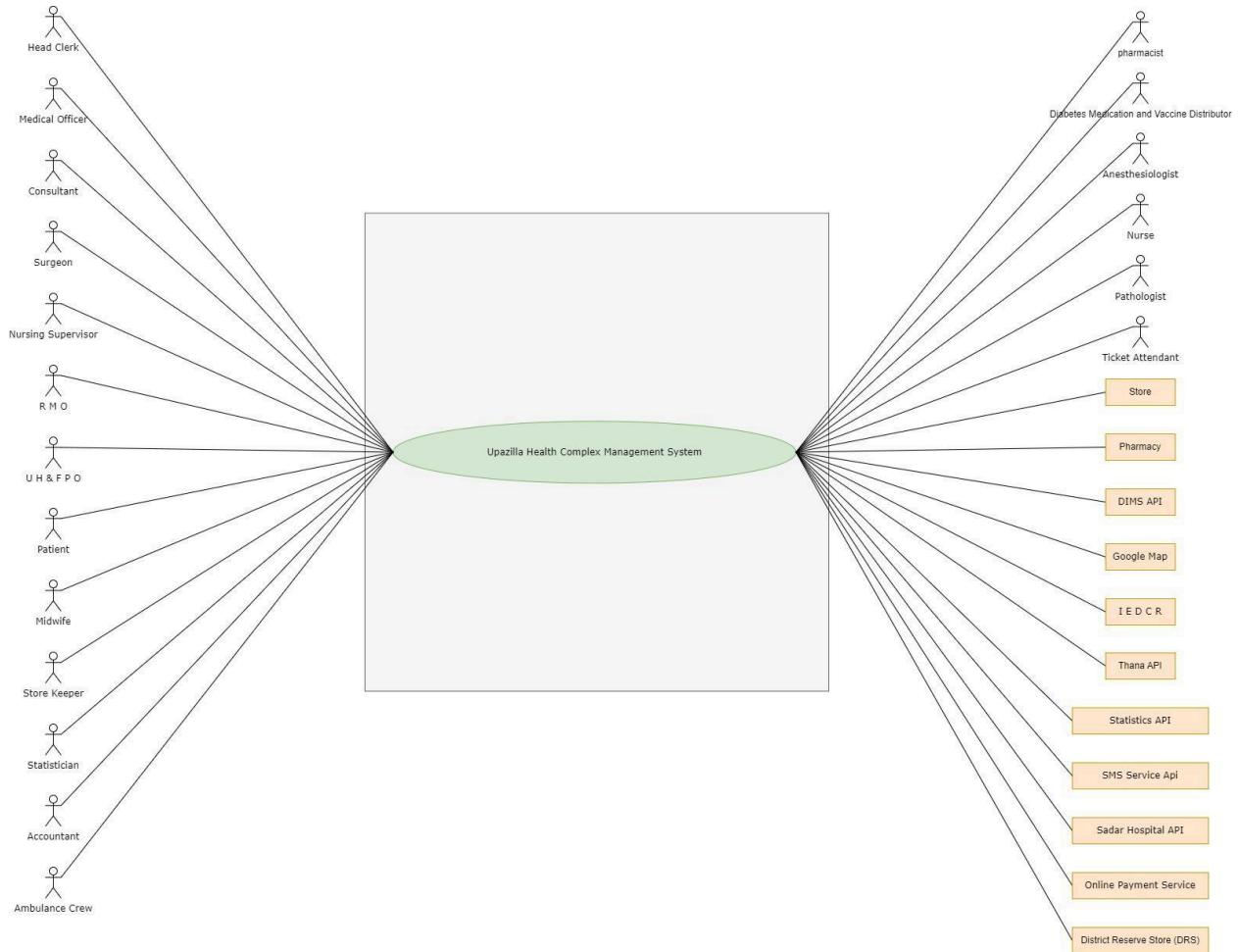


Figure: use case diagram level 0

Level1:

Primary Actors:

1. Patient.
2. Medical Officer.
3. Resident Medical Officer (RMO).
4. Consultant.
5. Surgeon.
6. Nursing Supervisor.

7. Midwife.
8. Ambulance Crew
9. Store Keeper.
10. Statistician.
11. Accountant.
12. UH&FPO
13. HDL(head clark)

Secondary Actors:

1. Ticket Attendants.
2. Nurse.
3. Pathologists.
4. Pharmacist.
5. Diabetes Medication and Vaccine Distributor
6. Anesthesiologist.
7. Accountant api
8. Midwives api
9. Thana api
10. District reserve store.
11. Google map
12. Statistics api
13. DIMS api
14. IEDCR api
15. Sadar Hospital Api
16. Store
17. Pharmacy
18. Online Payment System

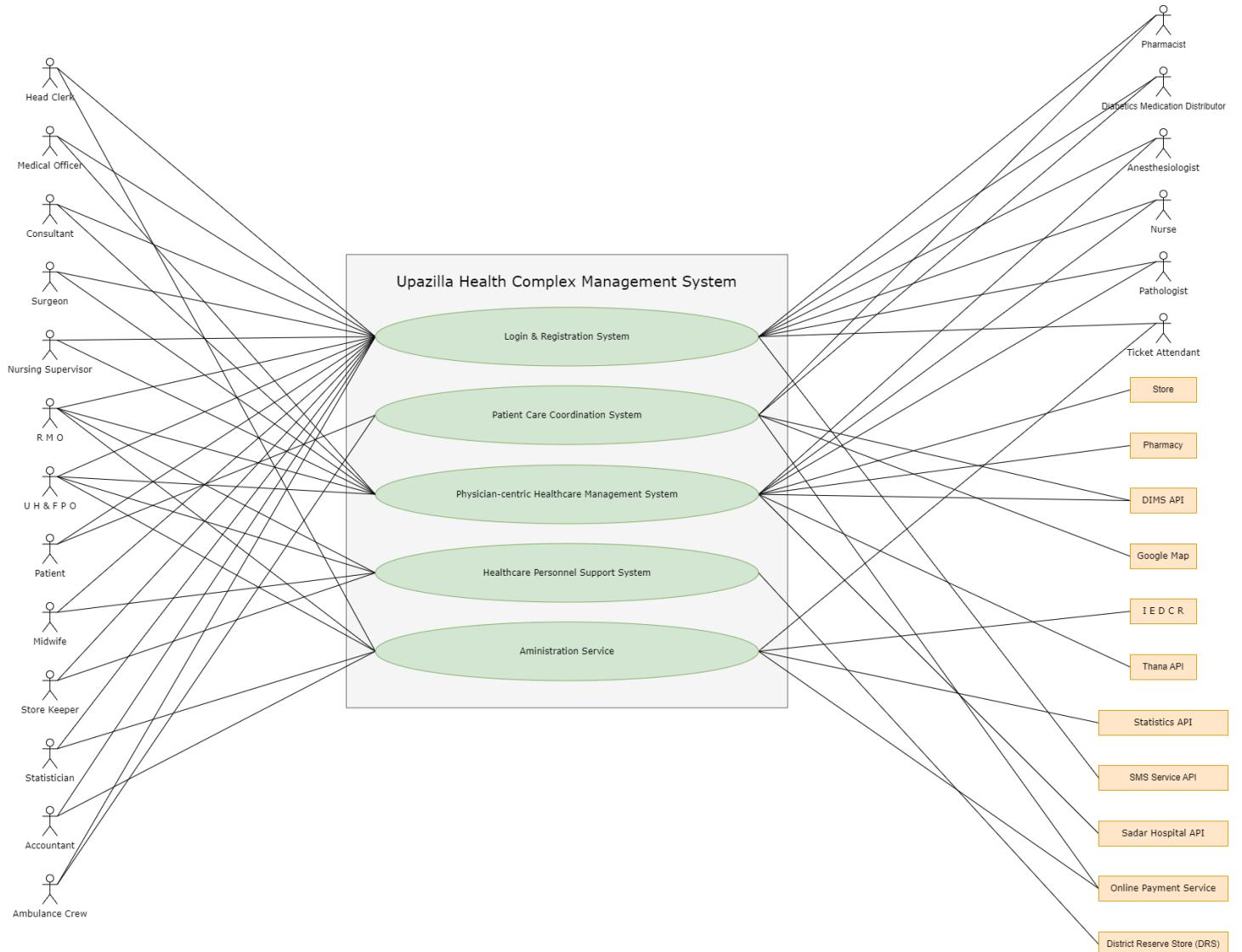


Figure: use case diagram level 1

Steps	Actors	Descriptions
Login & Registration System	All Employees Patient SMS Service API	System developers register the head clerk for each health complex during app deployment. The head clerk registers employees using their DGHS code, email,

		<p>phone number, NID, joining date, and a temporary password. The system fetches additional personal information from the NID server. Employees log in using their DGHS-provided employee ID. Patients register using their name, age, sex, address, contact information, and password, with NID or birth certificate required. Newborns are registered with their mother's NID/birth certificate. Patients receive a unique patient ID upon registration. Employees can log in to the system with their DGHS code and password, while patients can use their NID number or Profile ID and password. Users can request an OTP to reset forgotten passwords, sent to their registered phone number. Logged-in users can change their passwords through their profile settings.</p>
Patient Care Coordination System	Patient Pharmacist Diabetes and Vaccine Distributor Ambulance Crew DIMS API Google Map Online Payment Service	<p>Patients can access a number of services through the Upazila Health Complex app, including consulting schedules, hospital services, and emergency ambulance tracking and calling without creating an account. The patient and the ambulance crew can communicate in real time. Additional advantages for registered users include the capacity to buy e-tickets for medical services, secure access to medical test data and prescriptions, renewal of prescriptions and vaccines, and prescribed medication management with real-time updates and reminders. Prescribed prescriptions for medications are sent to verified patients, who have their IDs connected to them. Pharmacists dispense medications, keeping track of stock levels and patient profiles in real time.</p>
Physician-centric Healthcare Management System	Medical Officer Consultant Surgeon Nursing Supervisor RMO	<p>By giving RMOs and UHFPOs the ability to establish, amend, and notify staff schedules as well as handle leave requests, this step helps them manage rosters more efficiently. By allowing medical officers to verify bed availability, provide electronic tokens for</p>

	UH&FPO Anesthesiologist Nurse Pathologist Store Pharmacy DIMS API Thana API Sadar Hospital API	<p>patient admissions, and allow nursing supervisors to update bed status and mortality statistics, the software also simplifies indoor management. It is possible for medical professionals and diagnostic teams to communicate in real time, guaranteeing efficient operations and prompt updates.</p> <p>Surgeons are able to oversee surgical instruments and personnel availability while referring patients to Sadar hospitals, while medical officers and consultants are able to verify pharmacy inventories prior to writing prescriptions and report suspected medico-legal situations directly to the police.</p> <p>Medical officers, Consultants can search for patients by ID to access complete medical histories, aiding in diagnosis and treatment planning. Surgeons, nursing supervisors, and consultants can also use this information for pre-operative assessments. Electronic prescriptions with serial IDs are created by medical officers and consultants, instantly updating patient profiles for easy access and adherence. The referral system allows medical officers and consultants to transfer patient records to specialists at secondary or tertiary facilities. Doctors can use the DIMS API to search for medications and access comprehensive drug information, including indications, dosages, interactions, and safety considerations based on patient demographics.</p>
Healthcare Personnel Support System	RMO UH&FPO Midwife Storekeeper District Reserve Store	<p>Digital tracking and management of medical supplies, equipment, and prescriptions is made possible for storekeepers, RMOs, and UHFPOs via the Inventory Management system in the Physician-centric Healthcare Management Module. In civil surgeon offices, it consists of instruments for stock tracking, replenishment, and automated low-stock alerts to district reserve stores (DRS). Data is securely sent to the</p>

		healthcare app, enabling midwives to follow baby deliveries and maternal care within their current workflow with ease. When inventory levels drop below specified levels, the system automatically creates refill requests for the district hospital and for manual modifications by the storekeeper.
Administration Service	Head Clerk RMO UH&FPO Statistician Accountant Ticket Attendant IEDCR Statistics API Online Payment Service	The healthcare management app's Administration Service provides extensive features to streamline resource management and administrative duties. It has features including ticket sales tracking, effective personnel data administration, real-time staff and necessary supply availability checking, and strong financial management. It also gives UH&FPOs a central dashboard to monitor operations and improved statistical analysis capabilities for data-driven decision-making. Additionally, the system incorporates data-driven epidemic prediction, supporting proactive steps for efficient containment of possible outbreaks.

Level 1.1 : Login and registration system.

Primary Actors:

1. Head clerk.
2. Employee.
3. Patient.

Secondary Actors:

1. SMS API

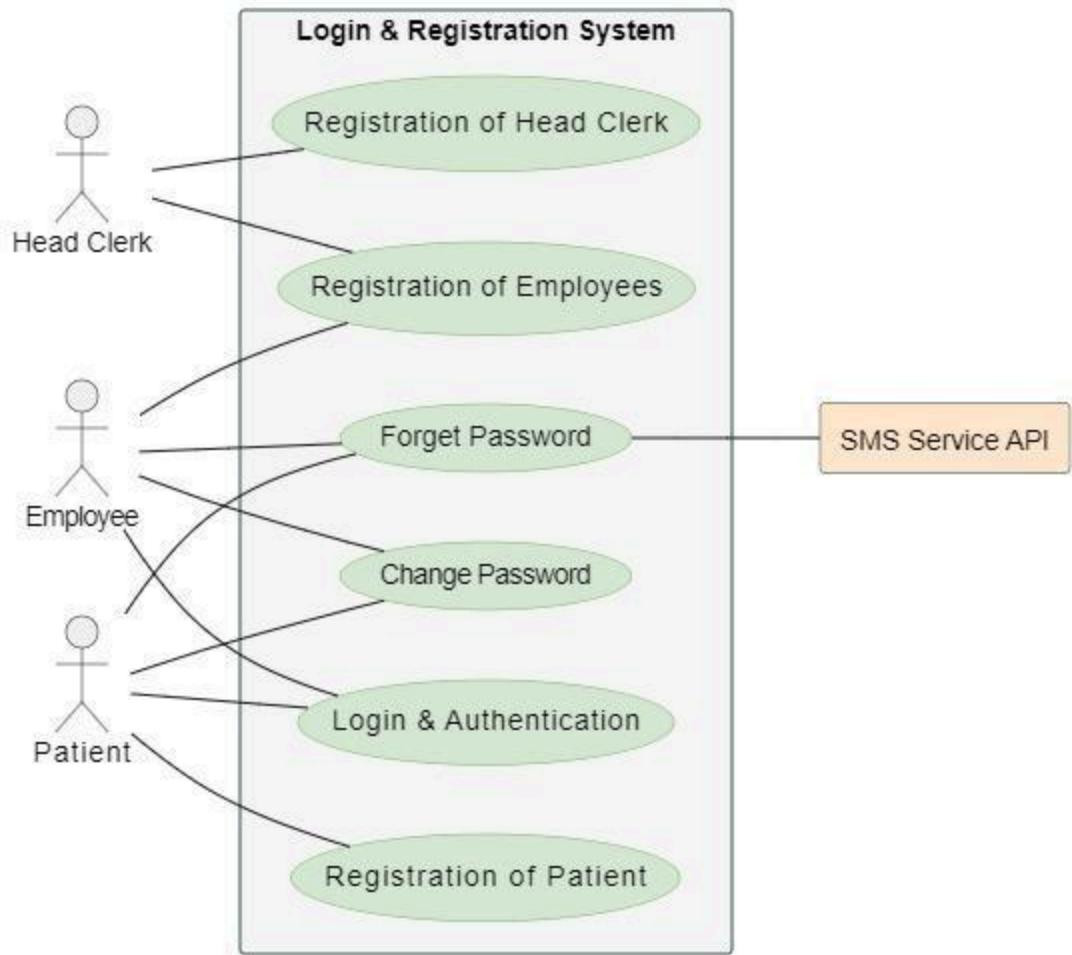


Figure: use case diagram level 1.1

Steps	Actor	Description
Registration of Head Clerk Registration of Employees	Head clerk	System developers register head clerks for every upazila health complex upon app launch. Head clerks are then authorized to add employees into the system by entering their personal information and DGHS code numbers.
Registration of Patient	Patient (Unregistered)	Patients register themselves by giving vital personal information and Newborns are linked to their mothers' NIDs or birth certificates.
Authentication Change Password Password recovery	Patient (Registered) Head Clerk All other Employees SMS Service API	The necessary credentials are used to ensure authentication. Users can reset their passwords by requesting that OTPs be issued to the phone numbers they have registered. Furthermore, after logging in, users can independently modify their passwords via their profile settings.

Level 1.2 : Patient Care Coordination System.

Primary actors:

1. Consultant
2. Patient
3. Ambulance Crew
4. Medical Officer.

Secondary actors:

1. Google Map
2. Online Payment Service

3. DIMS API

4. Pharmacist.

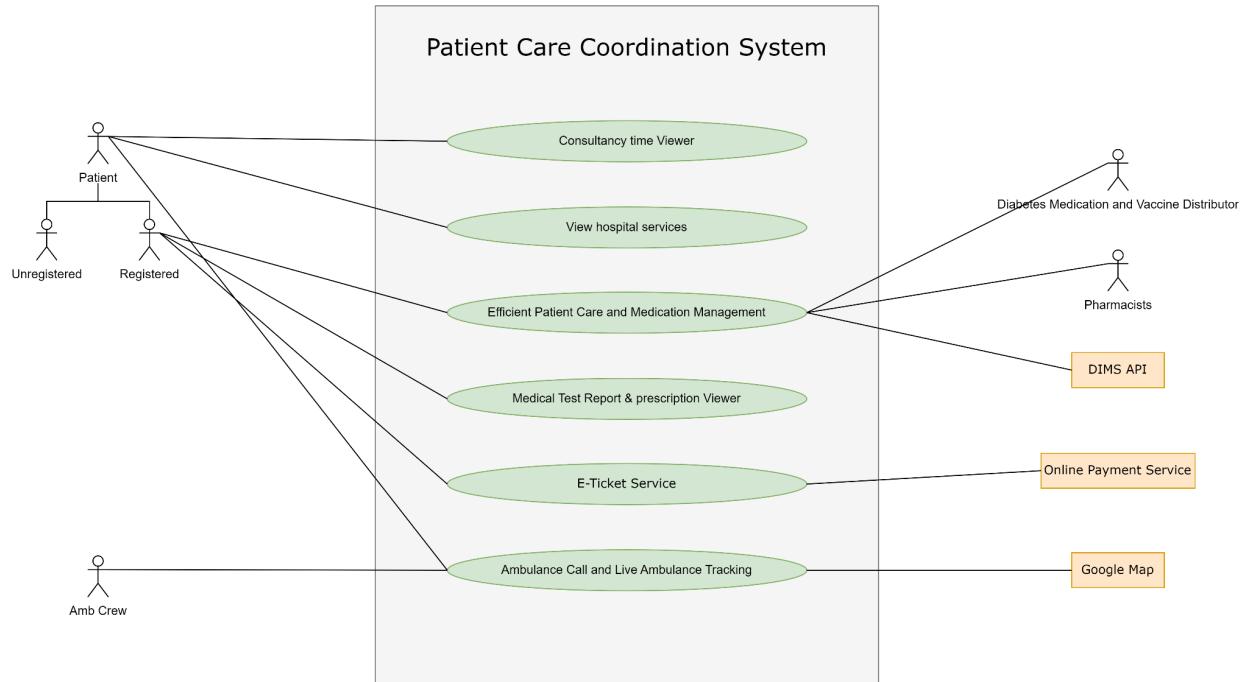


figure: use case diagram level 1.2

Steps	Actor	Description
Consultancy Time viewer View Hospital Service	Patient (Both Registered and Unregistered)	Patients can use the Patient Care Coordination System's services with or without an account. Important features like the Consultancy Time Viewer, which lets patients view consultant schedules for effective medical consultations and appointment scheduling, are readily accessible to patients. Furthermore, patients have access to a wide range of hospital services, such as labs, pharmacies, and specialty therapies, giving them a broad range of healthcare alternatives.
AmbulanceCall and Live	Patient (Both)	In an emergency, patients who are registered or who are not can quickly

Ambulance Tracking	Registered and Unregistered Ambulance Crew Google Map API	request an ambulance by using the Ambulance Call and Live Ambulance Tracking system. Patients can locate themselves with accuracy with the integration with Google Maps. Turn-by-turn directions are sent through this system of ambulances that have been sent. Patients can also choose to follow the ambulance's overall location.
Efficient Patient Care and Medication Management	Registered Patient Diabetes Medication and Vaccine Distributor Pharmacist DIMS API	Patients with accounts are provided with improved services by the system, which guarantees effective drug administration and patient care. Patients get a unique ID after registration , which allows for prescribed prescriptions for medications. Prescription drugs are supplied by pharmacists and vaccination distributors, who also give real-time and stock level updates. Patients get reminders for medications, renewing prescriptions, and vaccinations.
E-Ticket Service	Registered Patient Online Payment Service	The registered patients can buy tickets to gain access to indoor, outdoor or emergency services. They will be transferred to an online payment system to pay and confirm ticket purchase. A code shall be included in the ticket with which the patients shall be able to access the services.

Level 1.3 : Physician-centric Healthcare Management System.

Primary actors:

1. Surgeon
2. Medical Officer
3. Nursing Supervisor
4. RMO
5. UH&FPO
6. Consultant

Secondary actors:

1. Anesthesiologist
2. Pathologist.
3. Nurse.
4. Thana API.
5. DIMS API
6. Pharmacy
7. Store
8. Pharmacist.
9. Sadar Hospital API.

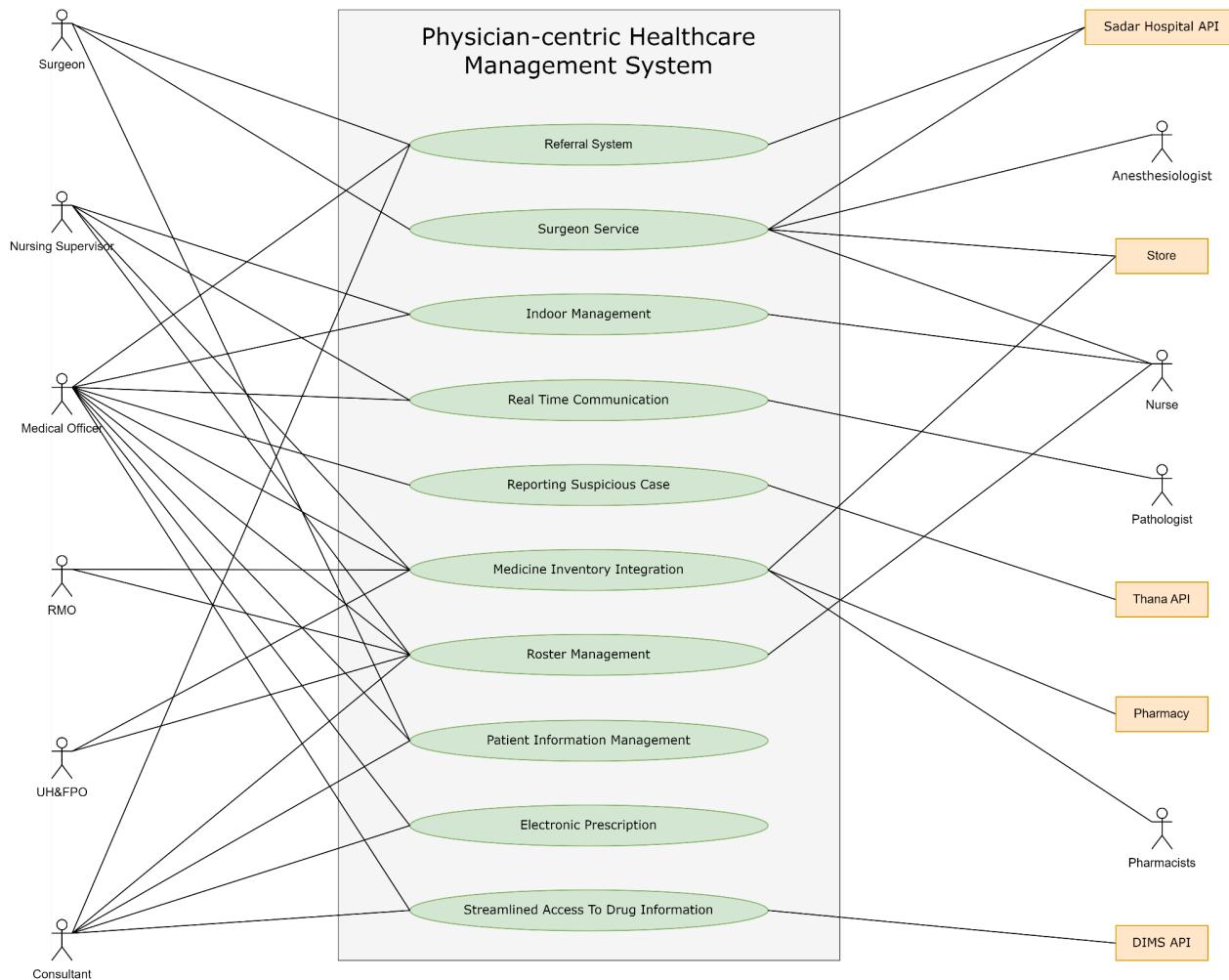


Figure: use case diagram level 1.3

Step	Actor	Description
Referral System	Medical Officer Consultant	Medical officers can obtain data regarding services and specialists provided by secondary or tertiary healthcare facilities. The medical records of a patient can also be electronically transferred to

		the desired facility.
Surgeon Service	Surgeon Sadar Hospital Api Anesthesiologist Store Nurse	The system allows surgeons to check staff and surgical equipment availability for scheduled surgeries. The allocated staff is automatically notified by the system about scheduled surgery. Patients may also be referred by surgeons to Sadar Hospital.
Indoor Management	Nursing Supervisor Medical Officer Nurse	In order to admit a patient , the medical officer can see the number of beds that are available and provide the on-duty nursing supervisor an electronic token number. The nursing supervisor has the power to update bed availability and accept patients based on the token. If a patient passes away, the nursing supervisor can also update the mortality statistics.
Real Time Communication	Nursing Supervisor Medical Officer Pathologist	Real-time communication is possible between nursing supervisors and medical officers. Furthermore, real-time communication occurs between medical officers and pathologists/lab technicians. Diagnostic test orders can be placed immediately by medical officers, and the pathology department will process and fulfill these requests with ease..
Reporting Suspicious Case	Medical Officer	Medical officers can report

	Thana API	suspicious medico-legal cases directly to the police station via the system.
Medicine Inventory Integration	UH&FPO RMO Nursing Supervisor Medical Officer Store Pharmacy Pharmacist	Medical officers can verify the availability of medicines in the pharmacy inventory before prescribing medication.
Roster Management	UH&FPO RMO Nursing Supervisor Medical Officer Consultant Nurse	RMOs and UHFPOs can manage their rosters more easily with the app. Schedules are made by RMOs, and notices are given prior to shifts. The system updates itself. UHFPOs update the roster and handle leave requests. This keeps everyone informed and the workflow efficient.
Patient Information Management	Medical Officer Consultant Surgeon	Using their IDs, medical officers, surgeons, nursing supervisors, and consultants can look up patients and obtain all of their medical records, including previous reports. The prescription will come with the doctor's ID.
Electronic Prescription	Medical Officer Consultant	Electronic prescriptions are generated for patients by medical officers and consultants. Upon creation, prescriptions are immediately linked to the patient's profile to enable prompt access and medication compliance.
Streamlined Access to	Medical Officer	Physicians (MOs,

Drug Information	Consultant DIMS API	consultants) can search for drugs using the DIMS API, which provides access to detailed data sheets with the most recent information on dosages, indications, contraindications, and possible side effects. These sheets also provide important cautions and safety concerns for each drug based on patient demographics.
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Level 1.4 : Healthcare Personnel Support System.

Primary actors:

1. Patient.
2. Midwife
3. Store keeper.
4. RMO
5. UH&FPO

Secondary actors:

1. District Reserve Store (DRS)

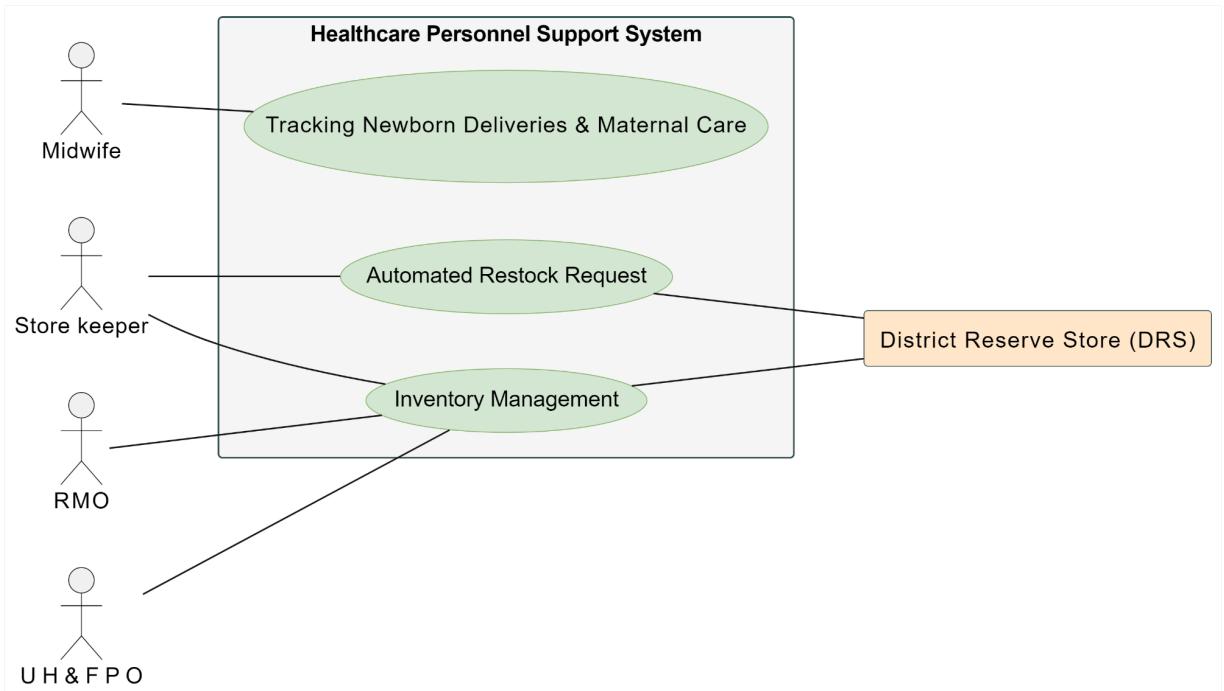


Figure: use case diagram level 1.4

Steps	Actors	Description
Tracking newborn deliveries and maternal care.	Midwife	Using their current app, midwives can easily monitor baby deliveries and maternal care. Data is updated within the app and securely transferred to the healthcare app.
Automated restock request.	Store keeper. District reserve store (DRS)	When inventory levels are low, the system automatically requests restocks for the district hospital based on thresholds defined by the storekeeper. Inventory management is optimized, and it supports notification failures and permits

		manual requests and adjustments.
Inventory management.	Store keeper. RMO UH&FPO District reserve store (DRS)	The app, which includes features for tracking, replenishing, and sending automated low-stock alerts to DRS, makes managing medical inventories easier for storekeepers, RMOs, and UHFPOs.

Level 1.5 : Administration Service.

Primary actors:

1. RMO.
2. Head Clerk.
3. Statistician.
4. Accountant.
5. UH&FPO

Secondary actors:

1. Statistics API.
2. IEDCR.
3. Ticket Attendant.
4. Online Payment System.

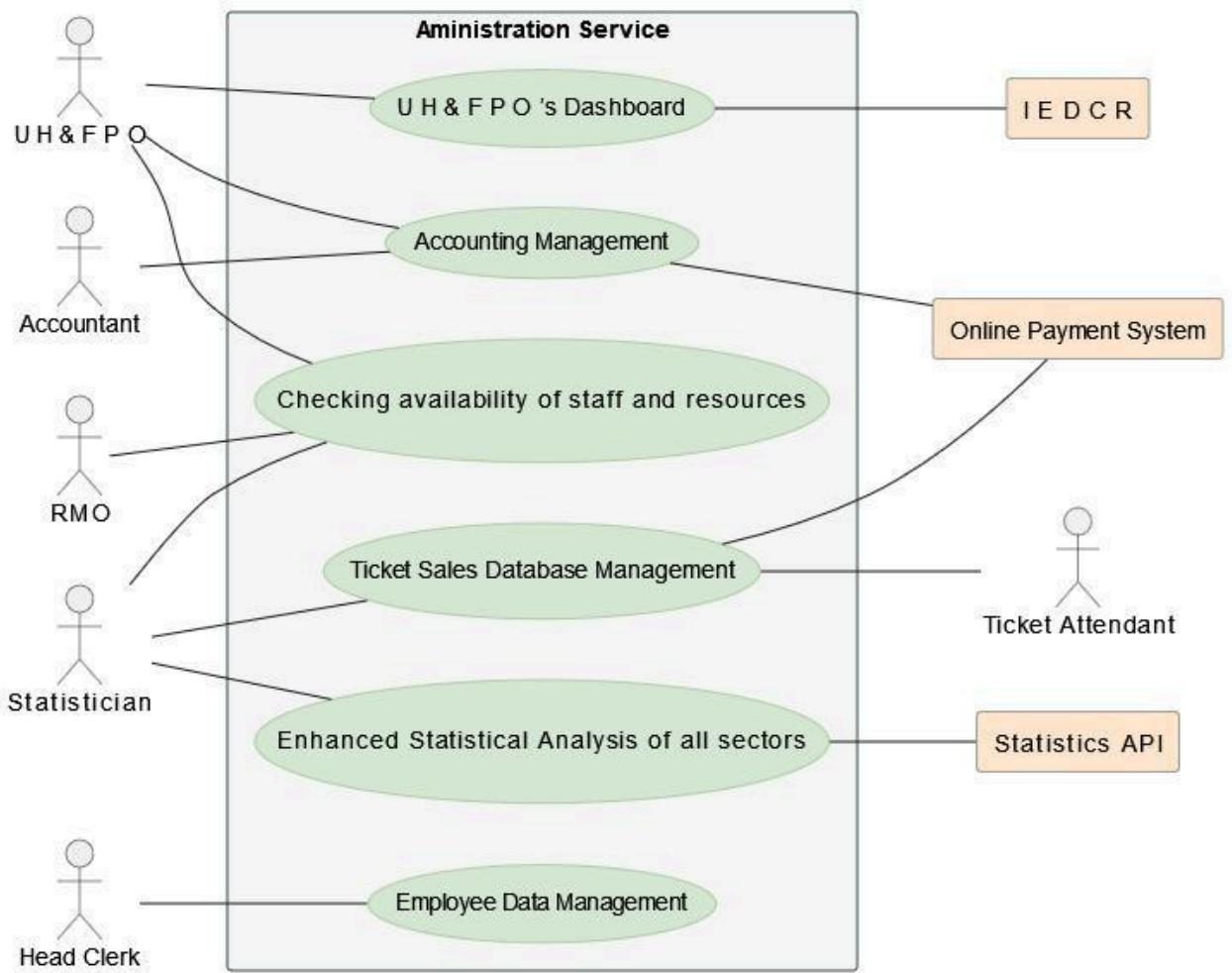


Figure: use case diagram level 1.5

Steps	Actors	Description
UH&FPO's Dashboard	UH&FPO IEDCR	Healthcare operations are centrally controlled through the UH&FPO Dashboard, which enables real-time staff, financial, and resource monitoring. It provides information on medication inventories, nursing activities, and the success of campaigns so that data-driven decisions may be made to enhance

		the provision of healthcare. Furthermore, the system helps UHFPOs take preventative action by predicting epidemics using statistical data from the IEDCR website.
Accounting management.	UH&FPO Accountant. Online Payment System.	This feature helps accountants monitor and manage healthcare finances efficiently, tracking disbursements across departments for informed decision-making. Direct communication with UHFPOs facilitates report generation and notifications, improving financial accountability and resource use.
Checking availability of stuffs and resources.	UH&FPO RMO Statistician.	The app section managed by UH&FPO ensures availability of doctors, nurses, support staff, and supplies like medications and medical equipment, ensuring efficient health complex operations.
Ticket sales and database management.	Statistician. Online Payment System. Ticket attendant.	Ticket sellers can track daily sales across healthcare departments with the use of the Ticket Sales Database Management function, which helps with resource optimization. Statisticians can analyze sales patterns and departmental performance with the use of real-time analytics.
Enhanced statistical analysis of all sectors.	Statistician. Statistics API	Statisticians use statistical techniques and interactive

		dashboards to evaluate departmental data in order to forecast resource requirements and evaluate the efficacy of healthcare. Customized reports for UH&FPO provide for data-driven decision-making to enhance service delivery and optimize resource allocation for better patient outcomes.
Employee data management.	Head Clerk	The Employee Data Management feature allows Head Clerks to efficiently manage employee information, including onboarding, certifications, and payroll, in a centralized system, reducing administrative overhead.

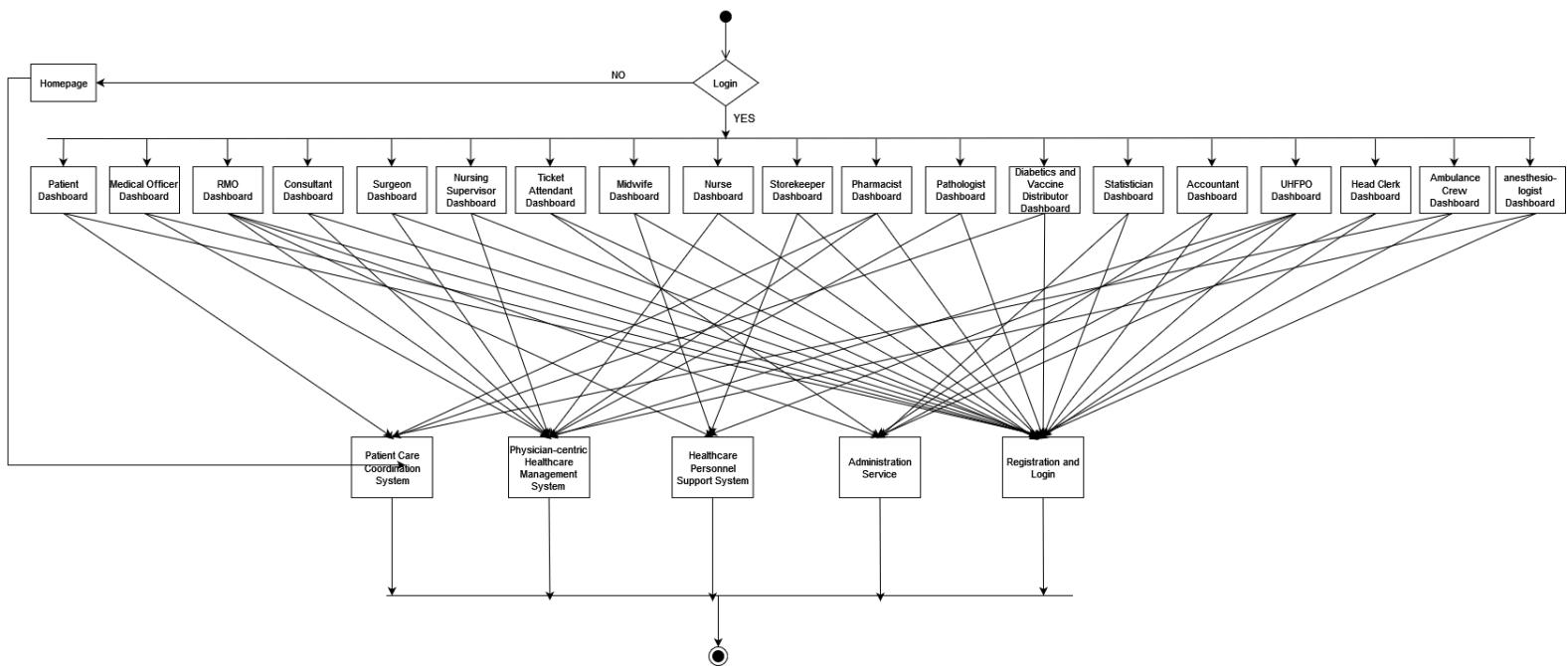
Activity Diagram

An activity diagram is essentially a flowchart that shows how one activity leads to another. It is essentially a more sophisticated flowchart that depicts how one activity leads to another.

Level: 1

Name: Upazila Health Complex Management

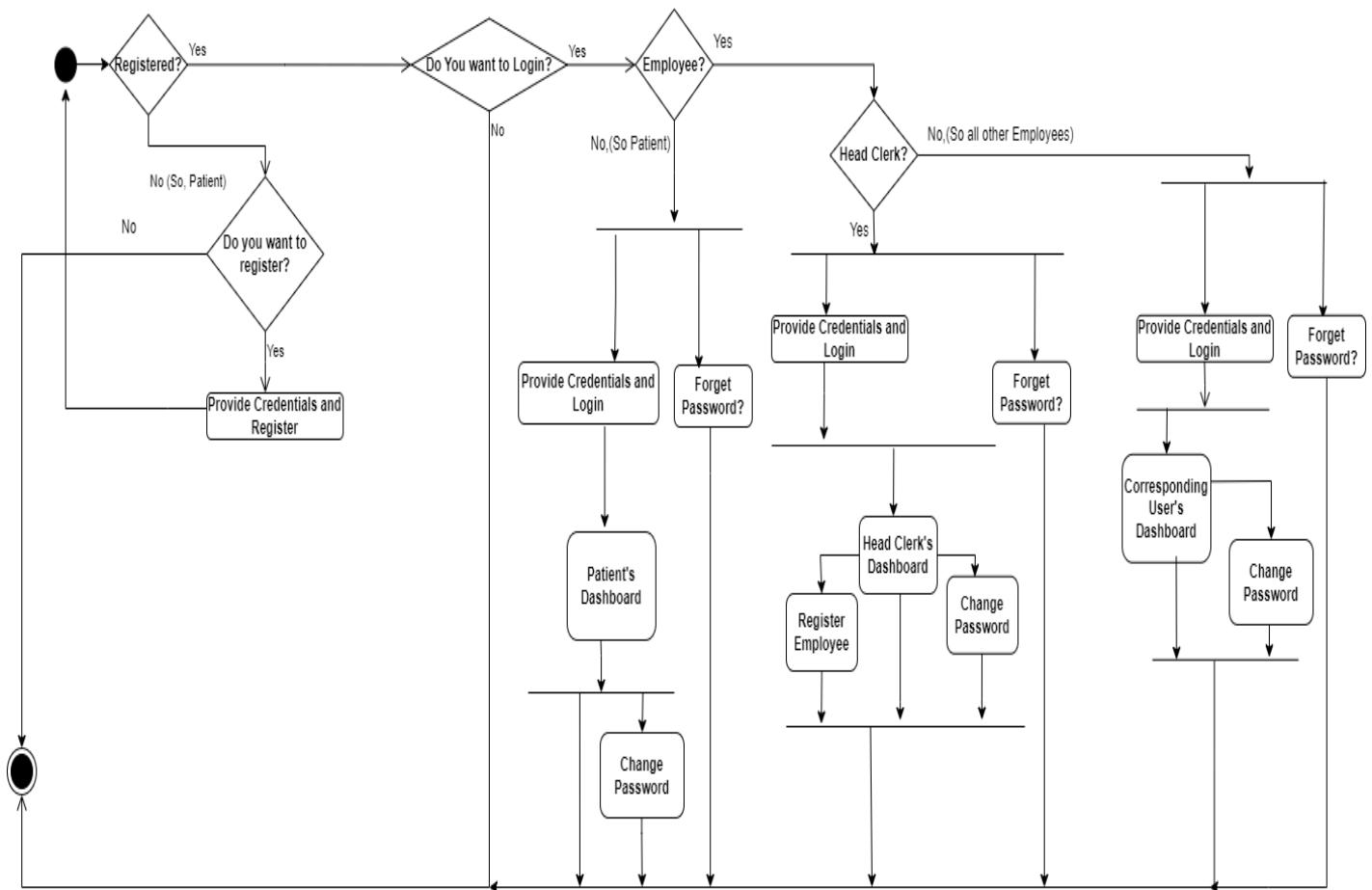
Reference: Use Case Diagram Level 1.



Level: 1.1

Name: Login and registration system.

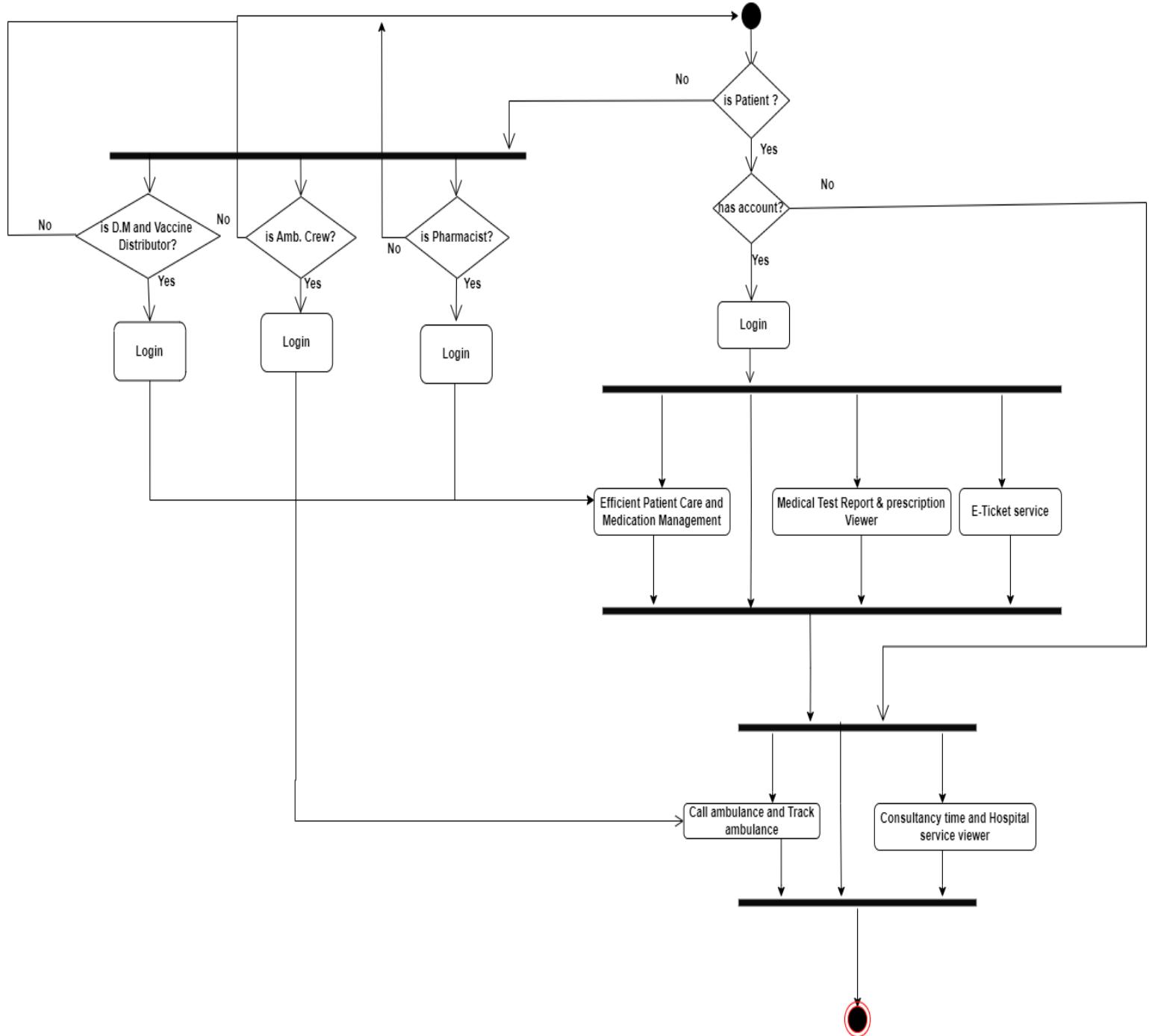
Reference: Use Case Diagram Level 1.1



Level: 1.2

Name: Patient Care Coordination System.

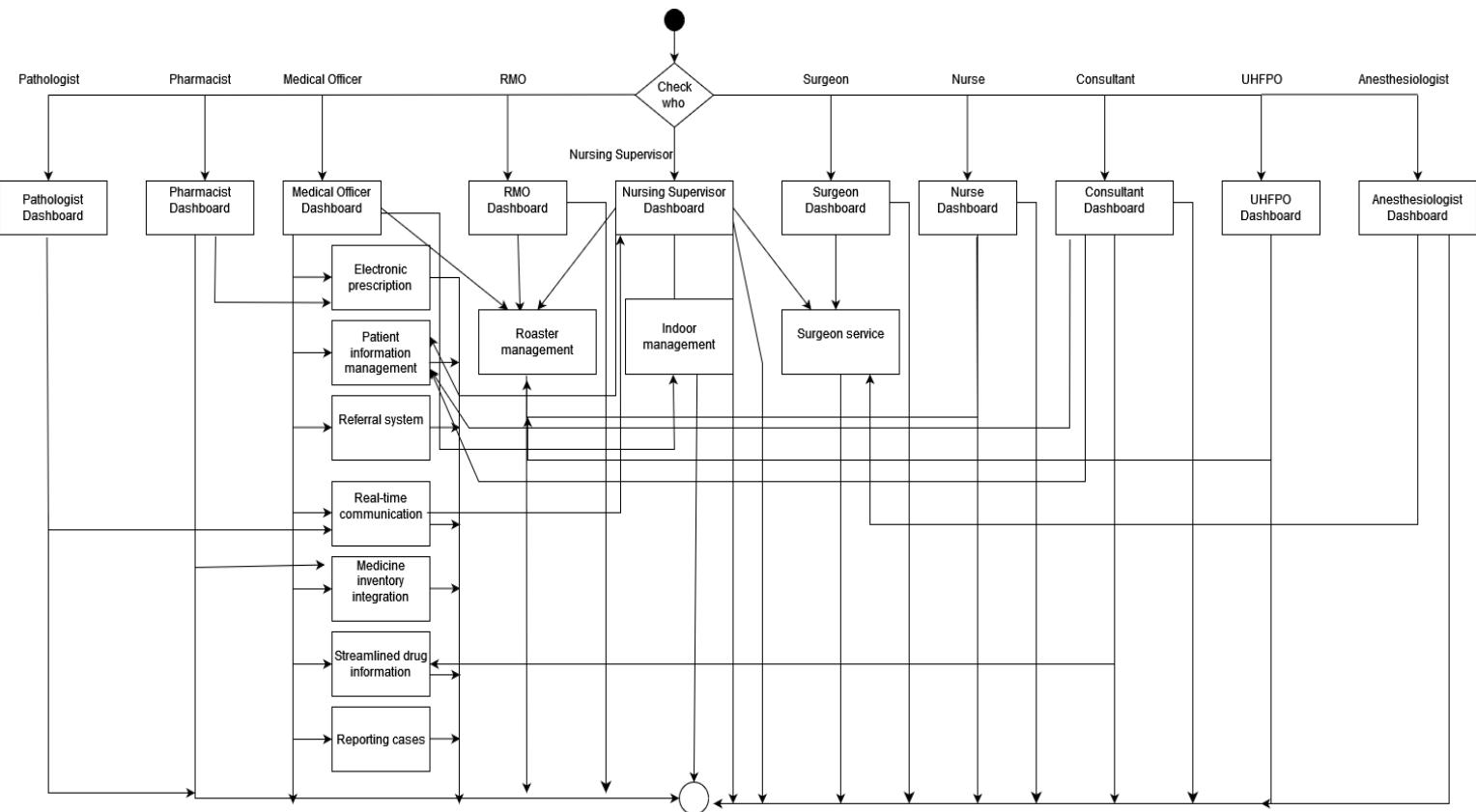
Reference: Use Case Diagram Level 1.2



Level: 1.3

Name: Physician-centric Healthcare Management System.

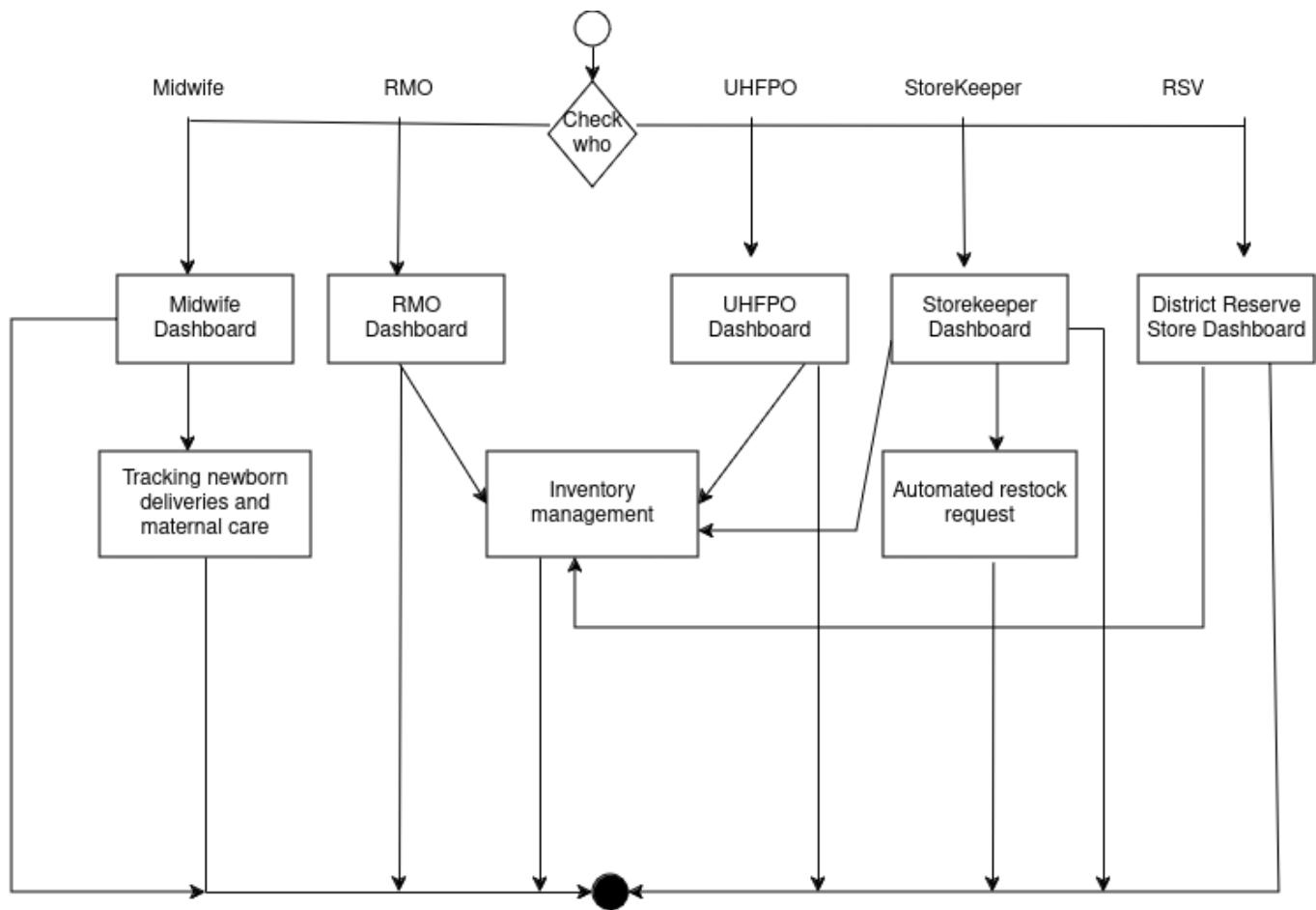
Reference: Use Case Diagram Level 1.3



Level: 1.4

Name: Healthcare Personnel Support System.

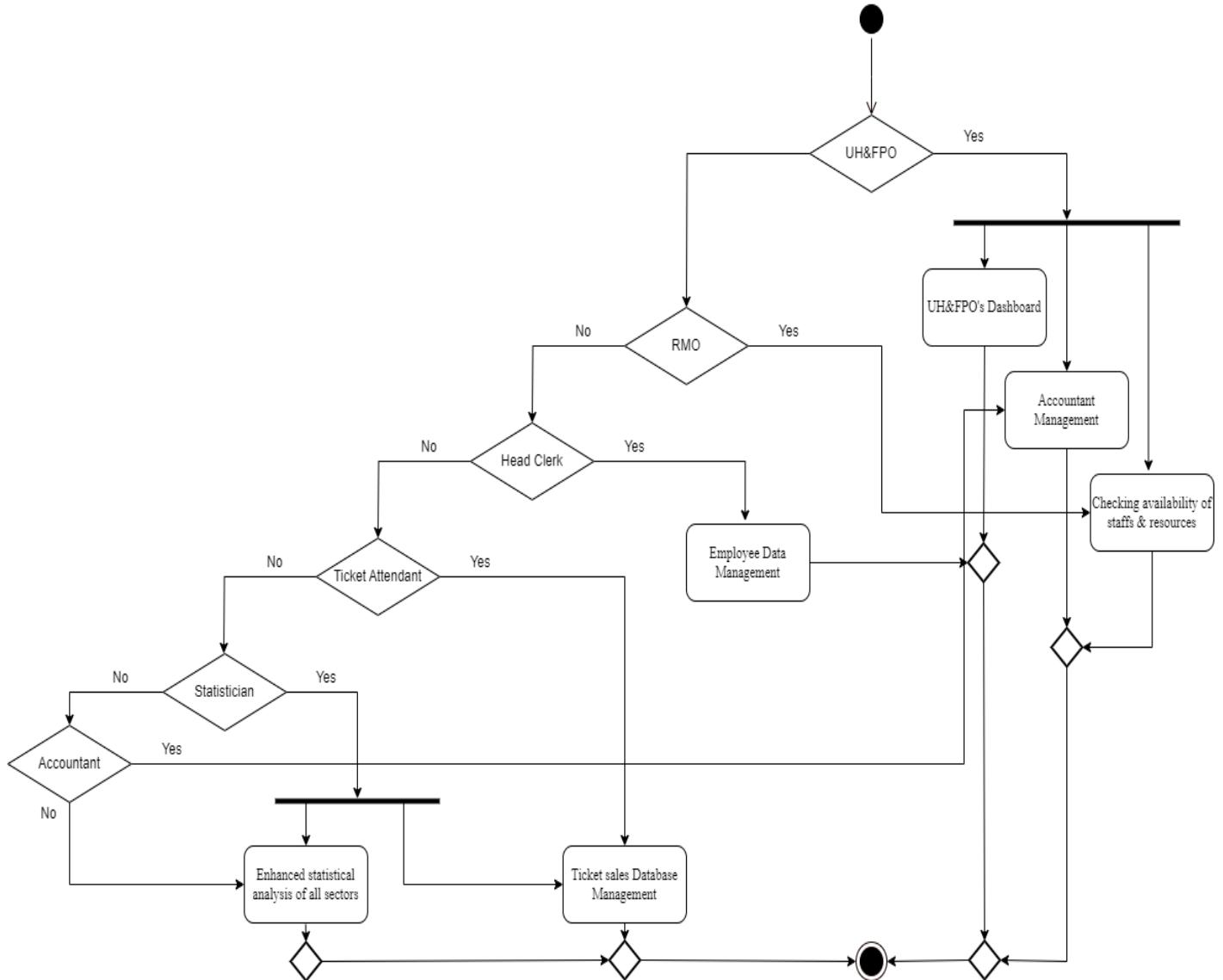
Reference: Use Case Diagram Level 1.4



Level: 1.5

Name: Administration Service.

Reference: Use Case Diagram Level 1.5



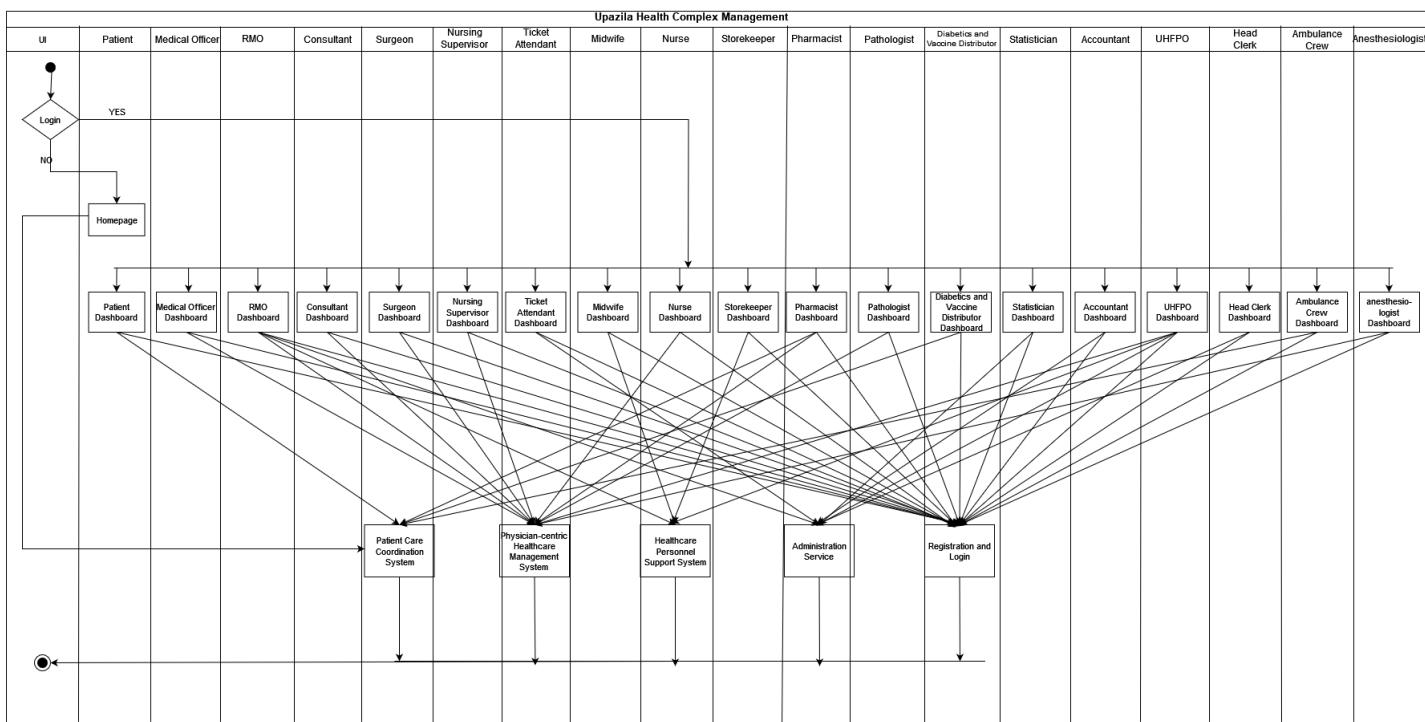
Swimlane Diagrams:

A swimlane diagram is a flowchart showing who is responsible for what throughout a flowchart that shows who is responsible for what throughout a certain procedure. Similar to a flowchart, it depicts a process from beginning to end, but it also classifies these phases to indicate which departments or individuals are in charge of each set of actions. Using a pool's lanes as an analogy, it places process stages within the vertical or vertical "swimlanes" of a specific division, team, or worker, as a result ensuring accountability and clarity.

Level: 1

Name: Upazila Health Complex Management

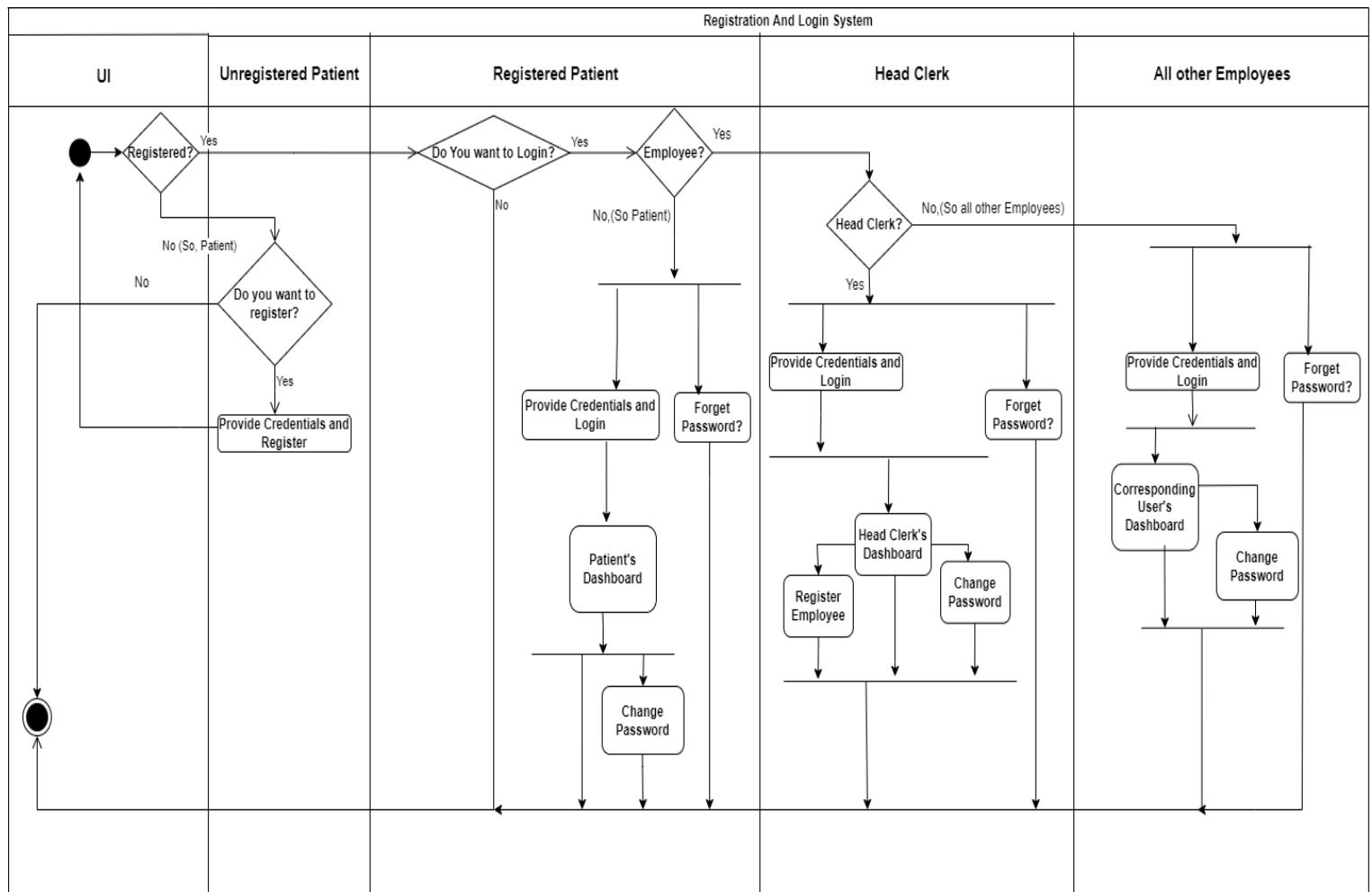
Reference: Use Case Diagram Level 1 & Activity Diagram Level 1



Level: 1.1

Name: Login and registration system.

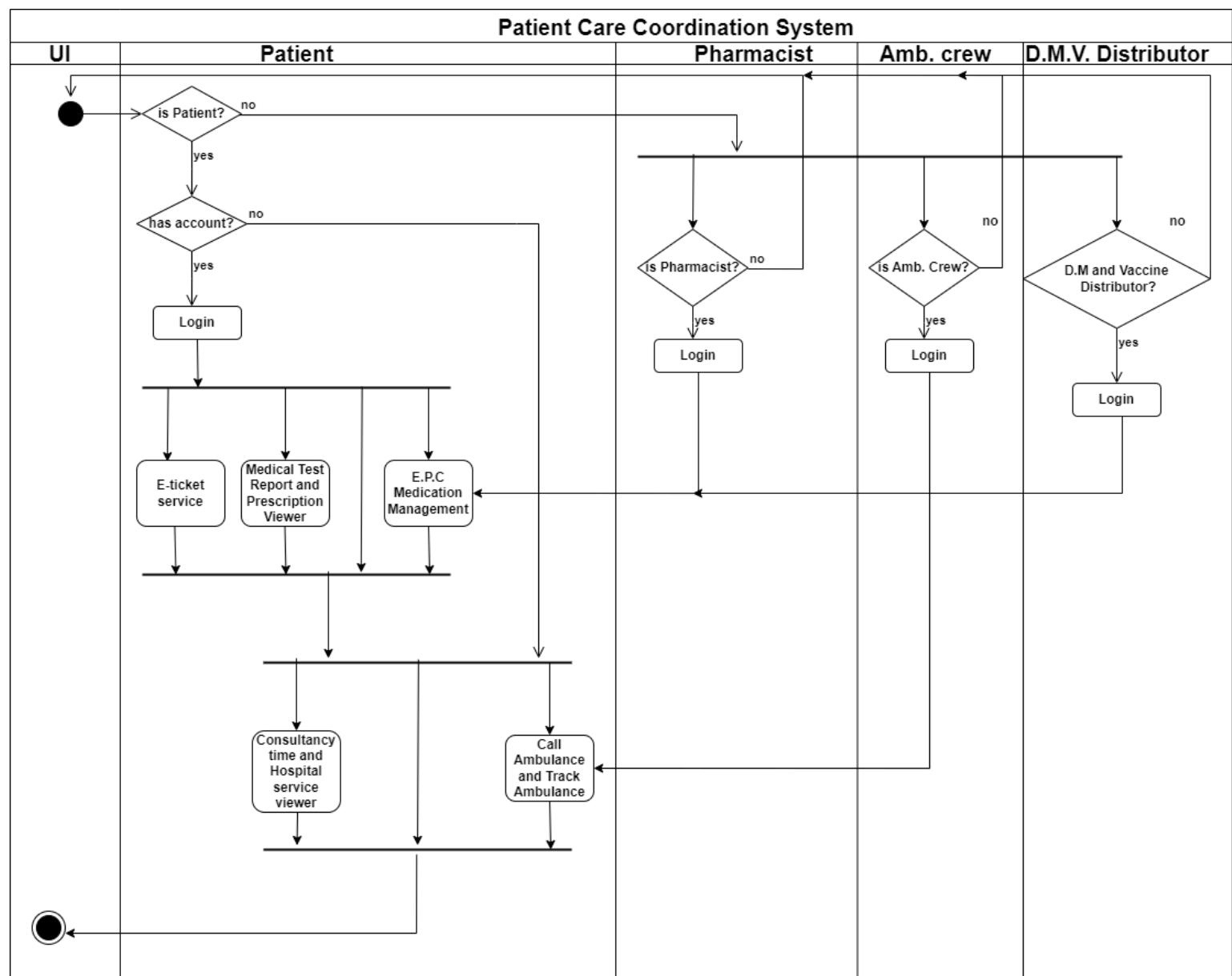
Reference: Use Case Diagram & Activity Diagram Level 1.1



Level: 1.2

Name: Patient Care Coordination System.

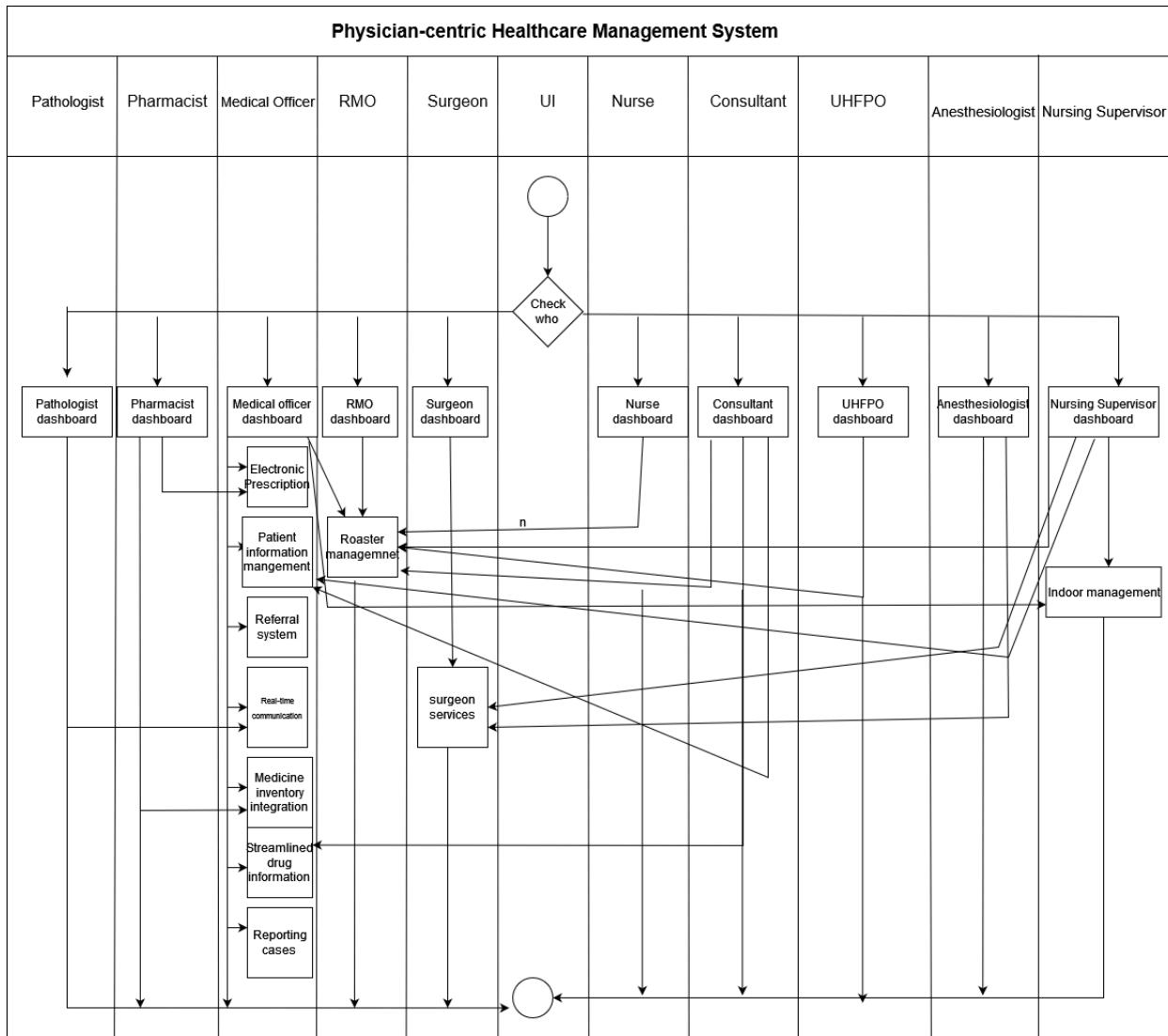
Reference: Use Case Diagram & Activity Diagram Level 1.2



Level : 1.3

Name : Physician-centric Healthcare Management System.

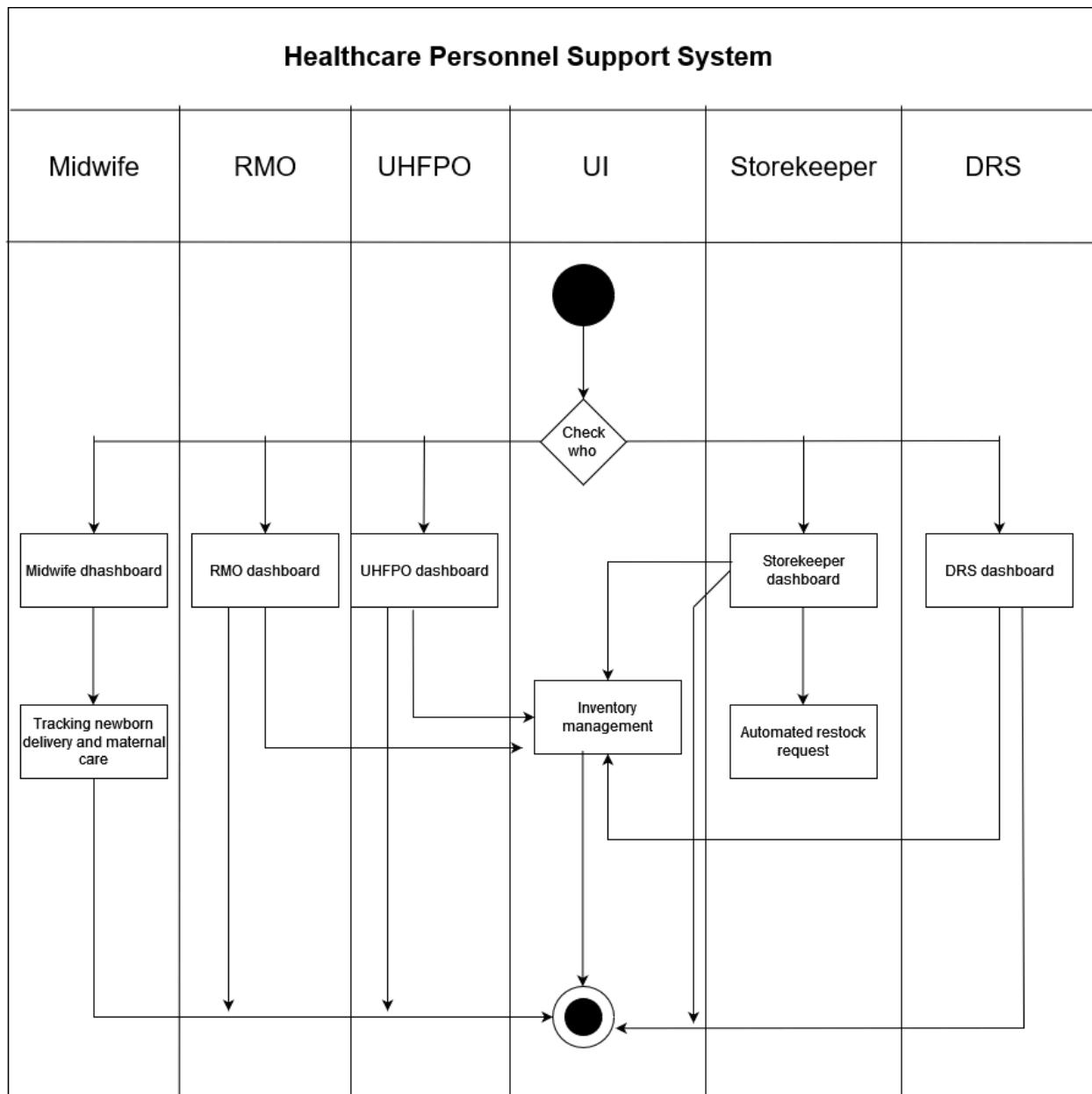
Reference: Use Case Diagram & Activity Diagram Level 1.3



Level : 1.4

Name : Healthcare Personnel Support System

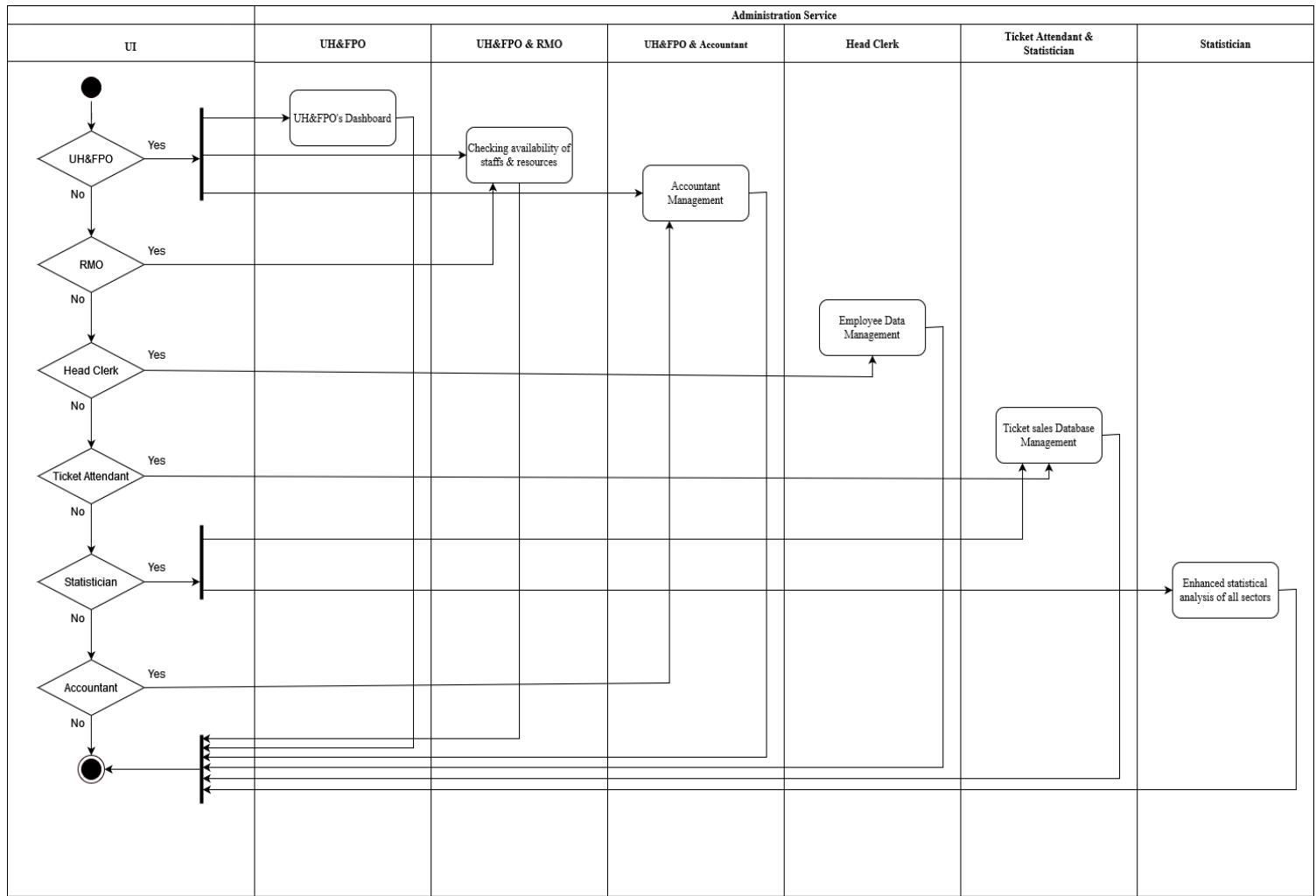
Reference: Use Case Diagram & Activity Diagram Level 1.4



Level: 1.5

Name: Administration Service.

Reference: Use Case Diagram & Activity Diagram Level 1.5



DATABASE MODELING

Data modeling concept:

If software requirements include the necessity to create, extend or interact with a database or complex data structures need to be constructed and manipulated, then the software team chooses to create data models as part of overall requirements modeling. The entity relationship diagram (ERD) defines all data objects that are processed within the system, the relationships between the data objects and the information about how the data objects are entered, stored, transformed and produced within the system.

Data objects:

A data object is a representation of composite information that must be understood by the software. Here, composite information means information that has a number of different properties or attributes. A data object can be an external entity, a thing, an occurrence, a role, an organizational unit, a place or a structure.

List of Nouns:

1.	Account	p	
2.	Accountants	s	5,44,102,120,122,136,150
3.	Accounting	p	
4.	Accounting Management	c	
5.	address	s	
6.	administration	p	
7.	Administration Service	s	
8.	age	s	
9.	allergies	p	
10.	ambulance	s	
11.	Ambulance Call	p	

12.	ambulance crew	s	5,44,97,102,120,122,136,150
13.	anesthesiologists	s	5,44,102,120,122,136,150
14.	app	p	
15.	appointments	s	
16.	area	s	
17.	Authentication	s	
18.	Bed number	s	
19.	bed availability	s	
20.	Bed filled	s	
21.	Birth count	s	
22.	budgets	s	
23.	Cases	s	
24.	center	p	
25.	certifications	p	
26.	Change Password	p	
27.	charge	p	
28.	child health	p	
29.	communication	p	
30.	cons	s	
31.	consultant	s	5,44,102,120,122,136,150
32.	contact information	s	
33.	contraindications	p	
34.	cost optimization	p	
35.	credentials	p	
36.	Dashboard	p	
37.	database	p	
38.	date	s	
39.	decisions	p	
40.	deliveries	s	
41.	demographics	s	
42.	departments	p	
43.	details	p	
44.	DGHS ID	s	
45.	diabetes medication and vaccine distributor	s	

46.	diagnosis	p	
47.	disbursements	s	
48.	diseases	s	
49.	district hospital api	p	
50.	district reserve	s	
51.	Doctors	s	5,44,102,120,122,136,150
52.	documents	s	
53.	dosages	s	
54.	drug (DIMS)	s	30,56,161
55.	Drug detail	s	
56.	drug name	s	
57.	duties	s	
58.	email	s	
59.	emergency healthcare	p	
60.	employee	s	5,18,21,44,97,102,118,120,122,136,150
61.	Employee Data Management	p	
62.	employee information	s	
63.	equipment	s	
64.	Family Planning Officer	s	
65.	feature	p	
66.	files	s	
67.	foods	p	
68.	future resource	p	
69.	Google Maps	p	
70.	government	p	
71.	Head Clerk	s	5,44,102,120,122,136,150
72.	Health Complex	p	
73.	health information	p	
74.	healthcare	p	
75.	healthcare app	p	
76.	healthcare delivery	p	
77.	healthcare facility	s	
78.	Healthcare Management System	p	
79.	healthcare organization	p	

	Healthcare Personnel Support System		
80.		p	
81.	healthcare system	p	
82.	Highlight	p	
83.	history	s	
84.	hospital	p	
85.	hub	p	
86.	IDs	p	
87.	IEDCR	p	
88.	Indoor Management	s	20,44
89.	inhabitants	p	
90.	inpatient	p	
91.	inventory management	s	
92.	inventory management system integration	p	
93.	Item name	s	
94.	job	p	
95.	job titles	s	
96.	labs	p	
97.	License number	s	
98.	Live Ambulance Tracking	p	
99.	location	s	
100.	Login	p	
101.	logs	s	
102.	mail	s	
103.	Management	p	
104.	management system	p	
105.	margin		
106.	maternity	p	
107.	medical officer	s	5,44,102,120,122,136,150
108.	medications	p	
109.	Medicine	s	
110.	medicine distribution	s	
111.	medicine inventory	s	
112.	Medicine Inventory Integration	p	

113.	Medicine name	s	
114.	Medicine Reminder	s	
115.	midwife	s	5,18,21,44,102,118,120,122,136,150
116.	Midwife API	p	
117.	Midwives	p	5,21,44,102,120,122,136,150
118.	Mortality count	s	
119.	mothers	d	
120.	name	s	
121.	navigation system	d	
122.	NID	s	
123.	notification	s	22,209
124.	Noun	d	
125.	nurse	s	5,18,44,102,120,122,136,150
126.	nursing	d	
127.	Nursing supervisor	s	5,44,102,118,120,122,136,150
128.	officials	d	
129.	online payment system api	s	223
130.	operations	s	
131.	OTP	p	
132.	OTP api	p	
133.	outages	d	
134.	outbreak prediction	d	
135.	outdoor	s	
136.	password	s	
137.	pathology department	d	44,141
138.	patient	s	102,120,122,136,141,150,231
139.	Patient	d	
140.	Patient Care Coordination System	d	
141.	patient ID	s	
142.	Patient Information Management	s	
143.	peak	d	
144.	performance	d	
145.	periods	d	

146.	pharmacies	d	
147.	pharmacist	s	5,44,102,120,122,136,150
148.	Pharmacy	s	113,162
149.	phone	d	
150.	phone number	s	
151.	police station api	p	
152.	population	d	
153.	prediction		
154.	pregnancy	d	
155.	Prescription	s	38,53,56,141,219
156.	prescription serial ID	s	
157.	prescription Viewer	s	
158.	procedures	p	
159.	profile	d	
160.	program development	d	
161.	pros		
162.	quantity	s	
163.	records	d	
164.	Registration	s	
165.	Reminder	s	
166.	Report ID	s	
167.	reports	s	44,141,166
168.	repository	d	
169.	requests	s	
170.	residents	p	
171.	resources	s	
172.	restock	p	
173.	restock request	s	
174.	restock request history	p	
175.	restock threshold	s	
176.	RMO	s	5,44,102,120,122,136,150
177.	roasting schedule	s	
178.	role	p	
179.	roster	s	44,219

180.	Rural Healthcare System Upazila Health Complexes	p	
181.	sales	s	
182.	Sales Database	s	
183.	Sales Database Management	s	
184.	schedules	s	
185.	secure repository	s	
186.	service delivery	p	
187.	Service name	s	
188.	services	s	187
189.	sex	s	
190.	share	p	
191.	sheets	p	
192.	shortages	p	
193.	specialists	p	
194.	spending	p	
195.	spreadsheets	p	
196.	staff	p	
197.	stakeholders	p	
198.	statisticians	s	544,102,120,122,136,150
199.	stock	s	
200.	Storekeeper	s	5,44,102,120,122,136,150
201.	stores	s	93,105,162
202.	story		
203.	supplements	s	
204.	supplies	p	
205.	support staff	p	
206.	surgeon	s	5,44,102,120,122,136,150
207.	surgery	s	
208.	system	p	
209.	Task name		
210.	tasks	p	
211.	telemedicine	p	
212.	test	s	
213.	Test Report	s	

214.	testing	p	
215.	thana api	p	
216.	The pathologist/lab technician	s	
217.	Ticket	s	42,141,223
218.	ticket attendant	p	
219.	Time	s	
220.	time Viewer	s	
221.	tools	p	
222.	track	s	
223.	Transaction ID		
224.	treatment	s	
225.	UH&FPO	s	5,44,102,120,122,136,150
226.	Upazila	p	
227.	Upazila Health Complex	p	
228.	user	p	
229.	vaccination	s	
230.	vaccine	p	
231.	Birth certificate	s	
232.	Availability	s	44
233.	Consultancy Time Viewer	s	44,219
234.	Pathologist	s	5,44,102,120,122,136,150

Data Objects:

- Patient
- Employee
- Doctor
- Statistician
- UH&FPO
- Accountant
- RMO
- Medical Officer

- Surgeon
- Consultant
- Anesthesiologist
- Roster
- Diabetes & vaccine distributor
- Pathologist
- Pharmacist
- Store keeper
- Nursing supervisor
- Midwife
- Nurse
- Ambulance crew
- Prescription
- Service
- Online Payment System
- Report
- Pharmacy
- Consultancy time viewer
- Notification
- Store
- Ticket

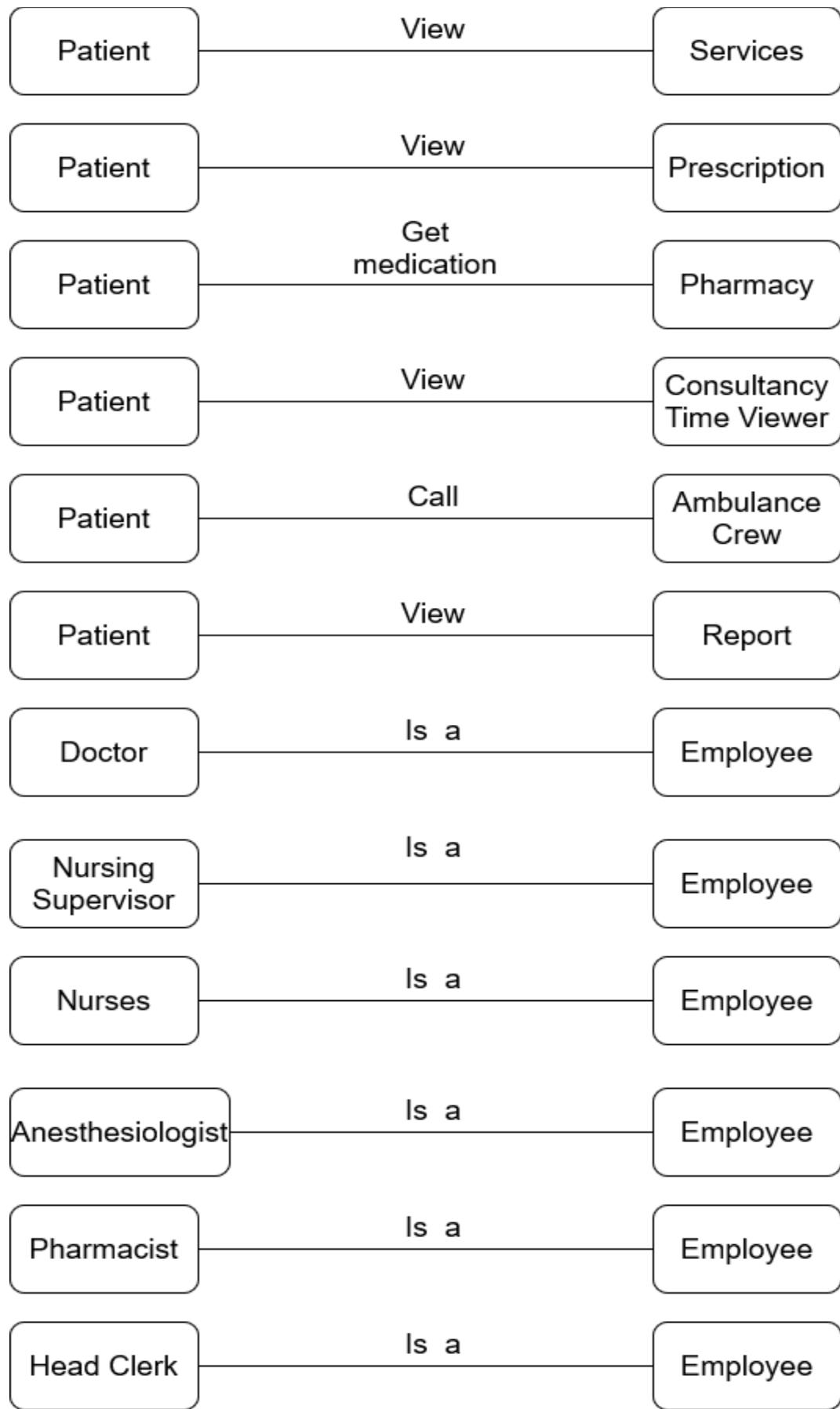
Relationship Between Data Objects

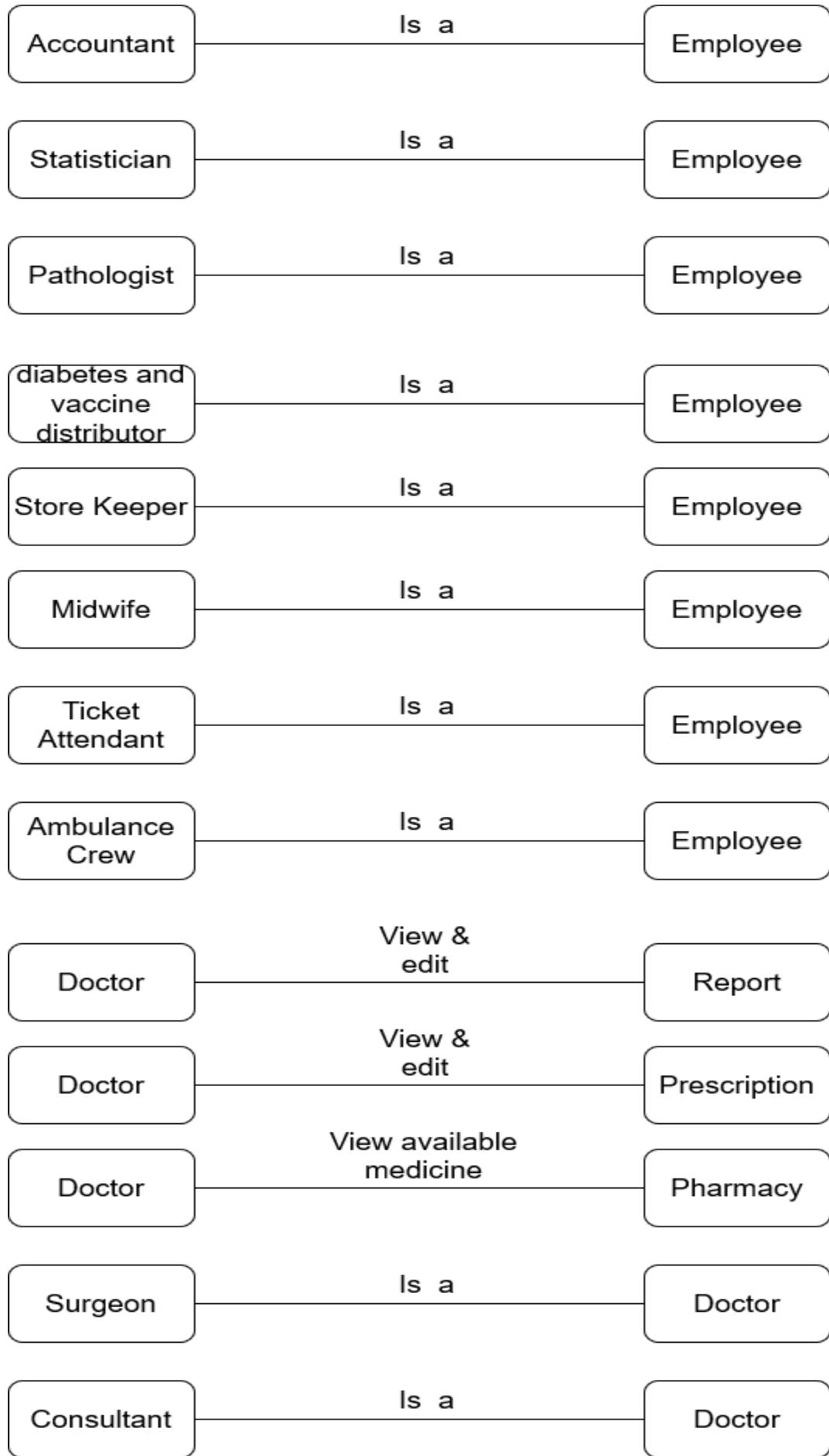
Schema Diagram:

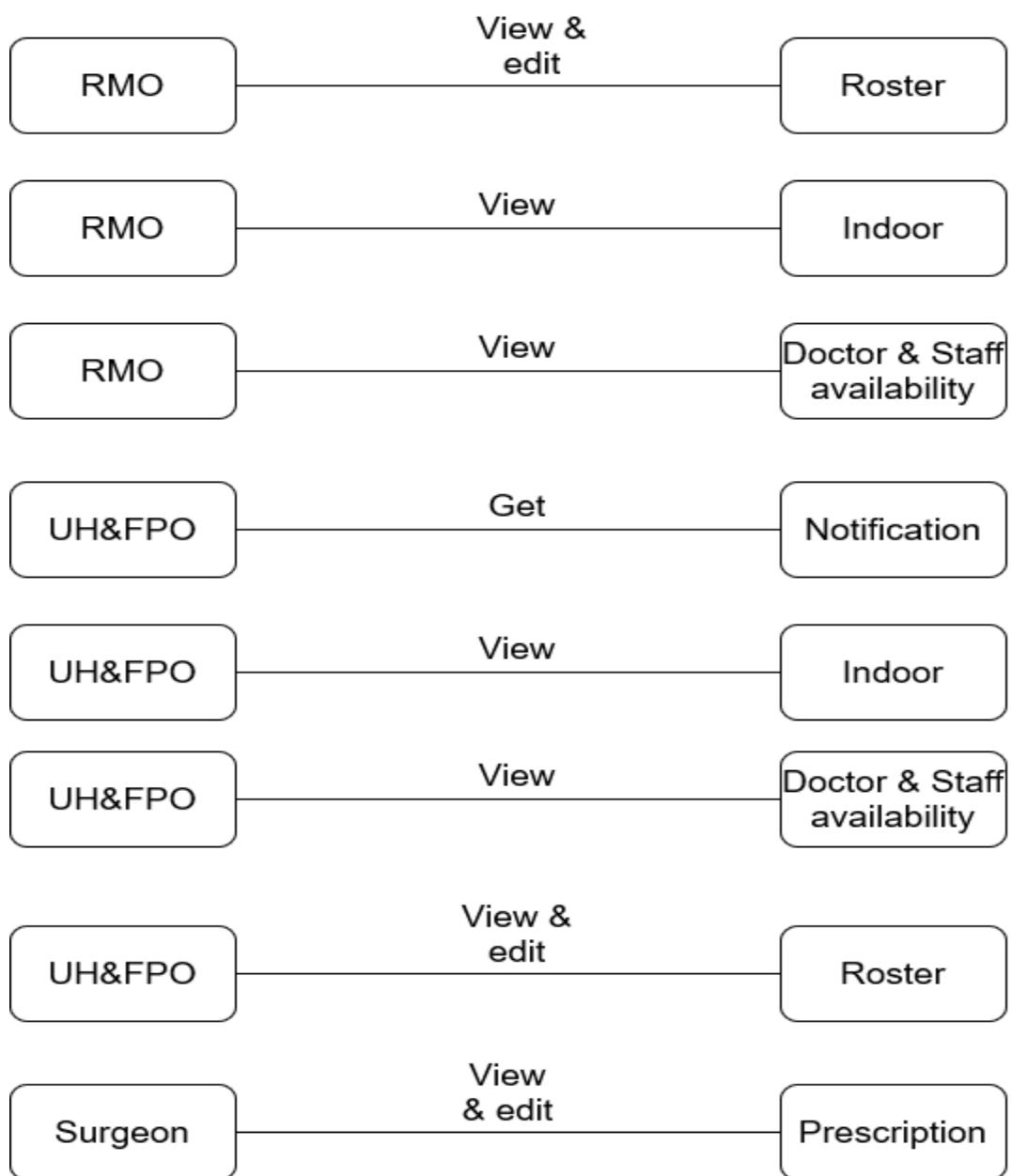
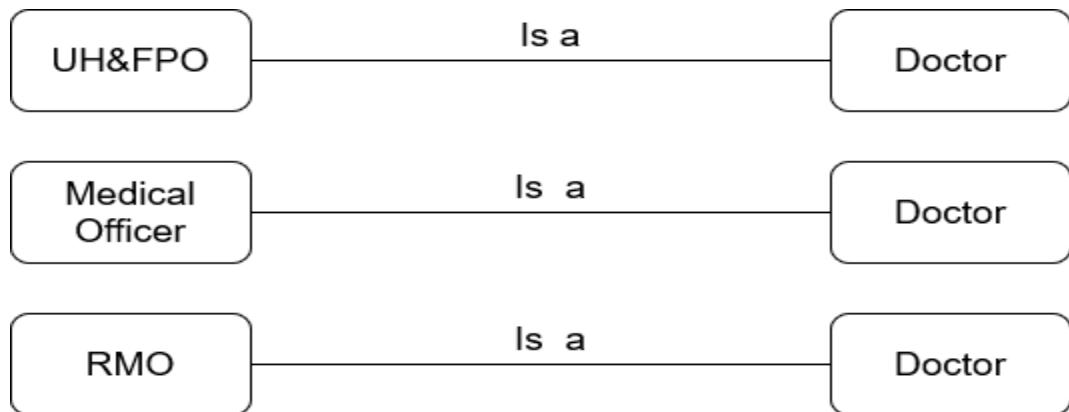
Prescription	<u>-date</u> <u>-drug_name</u> <u>-dosage</u> <u>-time</u> <u>-pid</u>	varchar2 varchar2 varchar2 varchar2 varchar2	40 40 40 40 40
Roster	<u>-dghs_id</u> <u>-time</u>	varchar2 varchar2	40 40
Ticket	<u>-tid</u> <u>-department</u> <u>-pid</u>	varchar2 varchar2	40 40
Service	<u>-name_of_service</u>	varchar2	40
DIMS	<u>-drug_name</u> <u>-detail</u> <u>-pros</u> <u>-cons</u>	varchar2 varchar2 varchar2 varchar2	40 40 40 40
Store	<u>-item_name</u> <u>-quantity</u> <u>-margin</u>	varchar2 number varchar2	40 40 40
Pharmacy	<u>-medicine_name</u> <u>-quantity</u>	varchar2 number	40 40
Report	<u>-report_id</u> <u>-pid</u> <u>-dghs_id</u>	varchar2	40
Online Payment System	<u>-transaction_id</u>	varchar2	40
Indoor	<u>-dghs_id</u> <u>-bed_filled</u>	Varchar2 Number	40
Pathology	<u>-pid</u> <u>-dghs_id</u>	varchar2 varchar2	40 40
Availability	<u>-dghs_id</u> <u>-isAvailable</u>	Varchar2 Boolean	40
Consultancy time viewer	<u>-dghs_id</u> <u>-time</u>	varchar2 varchar2	40 40
Notification	<u>-task_name</u> <u>-task_budget</u>	varchar2 number	40

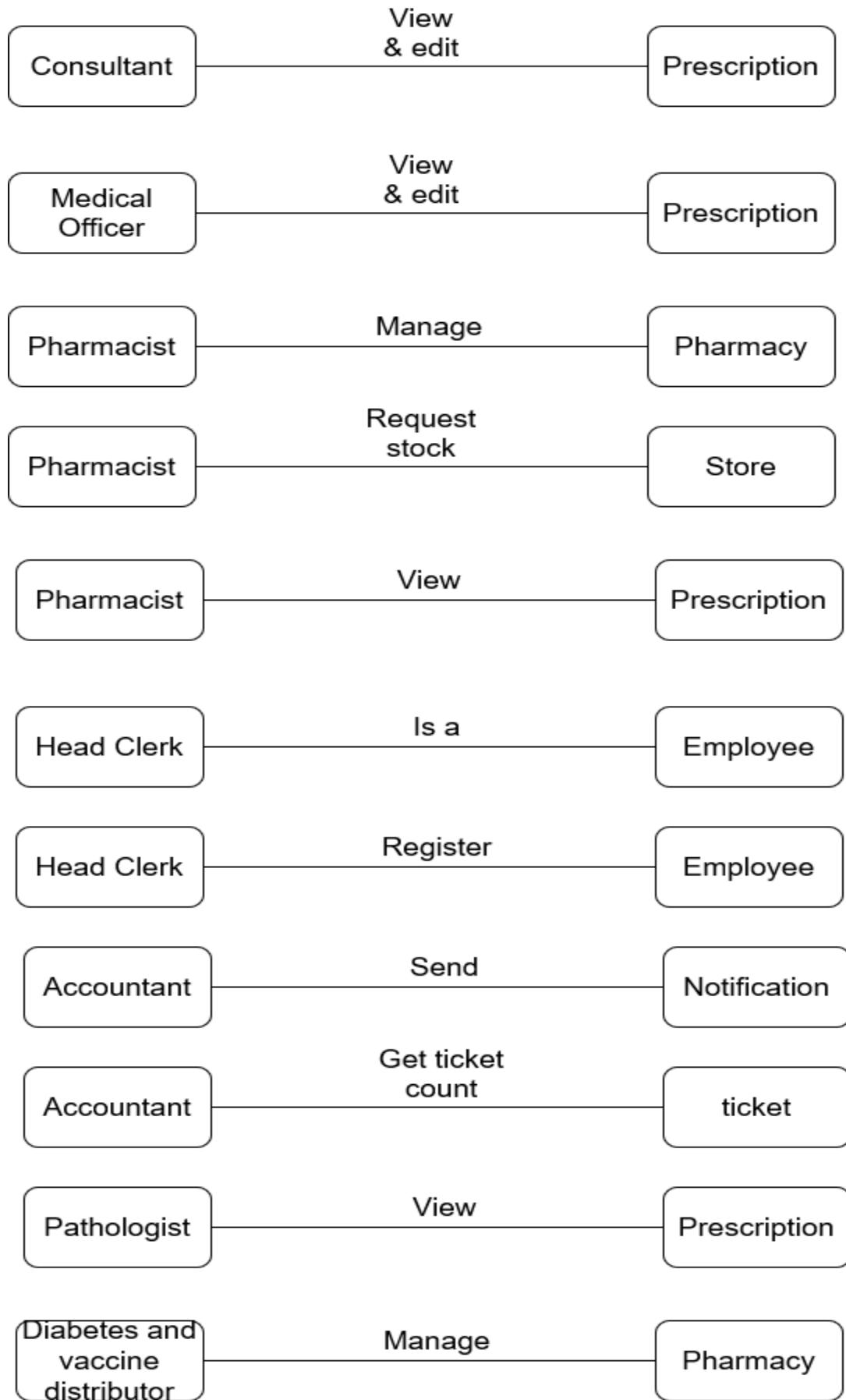
Relationships among data objects

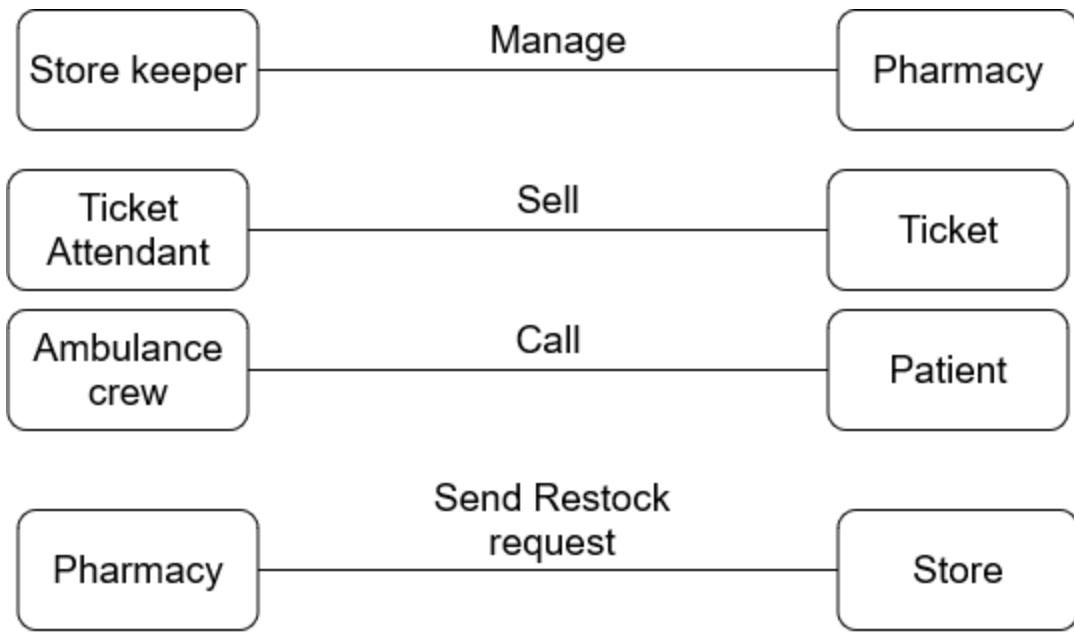
Analysis: The UH&FPO, RMO, medical officer, consultant, and surgeon have all been combined into one general group doctor. Additionally, we have combined physicians, pharmacists, anesthesiologists, ambulance personnel, storekeepers, accountants, nurses, nursing supervisors, statisticians, and midwives under the general class of employees. We have combined the businesses of "pharmacist" and "diabetes medication & vaccine distributor" into one. because they have the same kinds of characteristics.



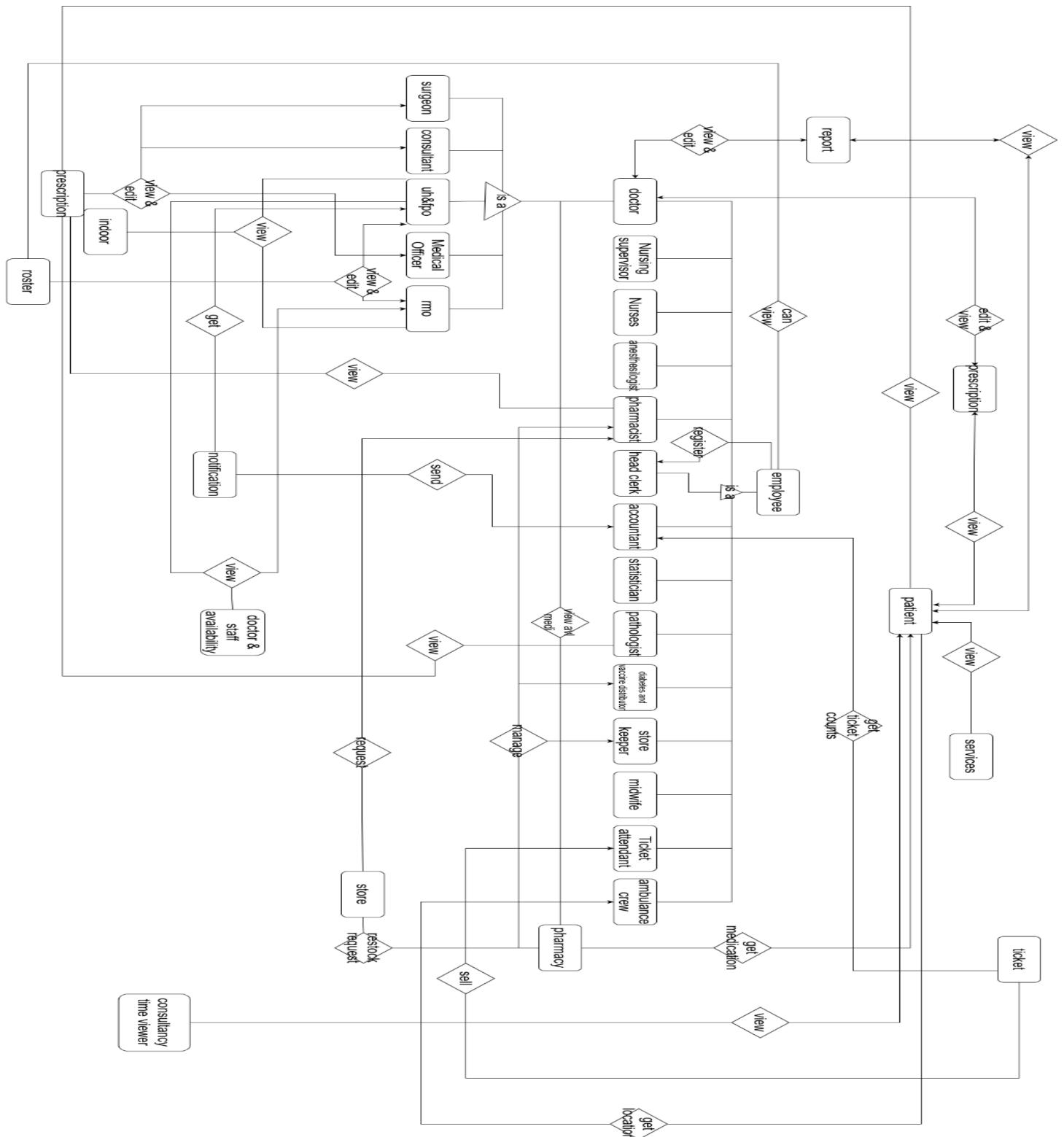








ER diagram



Class-Based Modeling

Class-based modeling defines the structure of the entire system by identifying the static structure of objects in that system. A class model defines attributes and operations for the objects of each

class and also the relationship between the objects, and the collaborations that occur between the classes of the systems. The elements of a class-based model include Classes and objects, Attributes, operations, class-responsibility-collaborator (CRC) models, collaboration diagrams, and packages.

General Classification:

In this section we'll include those classes that are in the solution space. These candidate classes are categorized based on the seven general classifications. The analysis classes manifest themselves in one of the following ways:

1. External entities
2. Things
3. Events
4. Roles
5. Organizational units
6. Places
7. Structures

A candidate class is selected for special classification if it fulfills two- three or more Characteristics.

SL NO.	NOUN	General Criteria
1.	account	2,7
2.	Accountant	4,7,

3.	address	2
4.	mail	2
5.	age	2
6.	ambulance crew	2,5,7
7.	anesthesiologists	4,5,7
8.	appointments	2
9.	area	6
10.	Authentication	3
11.	bed availability	2
12.	budgets	2
13.	pharmacist	4,5,7
14.	Cases	2
15.	Change Password	3
16.	consultant	4,5,7
17.	contact information	2
18.	date	2
19.	deliveries	2
20.	demographics	2
21.	diabetes medication and vaccine distributor	4,5,7
22.	DGHS code	2
23.	disbursements	2
24.	diseases	2
25.	district hospital api	1,2
26.	district reserve	1,2
27.	Doctors	4,5,7
28.	documents	2
29.	dosages	2
30.	thana api	1
31.	drug (DIMS)	1
32.	drug information	2
33.	duties	2
34.	email	2
35.	employee	4,5,7
36.	employee information	2
37.	equipment	2

38.	Family Planning Officer	4,7
39.	files	2
40.	future resource	2
41.	Google Maps	1
42.	Head Clerk	4,7
43.	healthcare facility	2
44.	history	2
45.	IEDCR	
46.	Indoor Management	5,6,7
47.	medical officer	4,5,7
48.	location	2
49.	Login	3
50.	logs	2
51.	Medicine	2
52.	medicine distribution	3
53.	medicine inventory	5,6,7
54.	Medicine Reminder	3
55.	Midwives	4,7
56.	mortality	2
57.	name	2
58.	NID	2
59.	notification	2,3,7
60.	nurse	4,5,7
61.	Nursing supervisor	4,7
62.	operations	2
63.	OTP	2
64.	outdoor	5,6,7
65.	password	2
66.	patient	4,5,7
67.	patient ID	2
68.	Patient Information Management	2
69.	Pharmacy	6,7
70.	phone number	2
71.	police station api	1
72.	Prescription	2,7

73.	prescription Viewer	2
74.	prescription serial ID	2
75.	Registration	3,7
76.	Reminder	3
77.	reports	2
78.	requests	3
79.	resources	2
80.	restock request	3
81.	restock threshold	2
82.	RMO	4,7
83.	roasting schedule	2,7
84.	roster	
85.	sales	2
86.	midwife	4,5,7
87.	Midwife API	1
88.	services	2
89.	sex	2
90.	staff	
91.	statisticians	4,5,7
92.	stock	2
93.	Storekeeper	4,5,7
94.	ticket attendant	4,5,7
95.	supplements	2
96.	surgeon	4,5,7
97.	surgery	2
98.	test	2
99.	Report	2
100.	The pathologist/lab technician	4,5,7
101.	Ticket	2
102.	Time	2
103.	job titles	2
104.	track	3
105.	treatment	2
106.	UH&FPO	4,7
107.	vaccination	2

108.	online payment system api	1
109.	SMS api	1

Potential To Be Class-

All orange colored Nouns. Total 42 in Numbers.

Selection Criteria:

In this section we'll include those classes that are selected in general classification. These candidate classes are then selected as classes by six Selection Criteria. The criterias are

1. Retain information
2. Needed services
3. Multiple attributes
4. Common attributes
5. Common operations
6. Essential requirements

A candidate class generally becomes a class when it fulfills around three characteristics.

SI no.	Potential Class Nouns	Selections Criteria
1.	Accountants	1-5
2.	ambulance crew	1-5
3.	anesthesiologists	1-5
4.	pharmacist	1,5
5.	consultant	1-5
6.	diabetes medication and vaccine distributor	1-5
7.	district hospital api	1,2,6
8.	district reserve store	1,2,6
9.	Doctors	1
10.	thana api	2,6
11.	drug (DIMS)	1,6
12.	employee	1-5

13.	Family Planning Officer	
14.	Google Maps	1,2,6
15.	Head Clerk	1,2,3,6
16.	IEDCR	6
17.	Indoor Management	1,2,3,6
18.	medical officer	1-5
19.	medicine inventory	1,2,3,6
20.	notification	1,2
21.	nurse	1-5
22.	Nursing supervisor	1,2,3,6
23.	outdoor	1,2,3
24.	patient	1-5
25.	Pharmacy	1,2,3,6
26.	police station api	
27.	Prescription	1,2,3,6
28.	RMO	1,2,3,6
29.	roasting schedule	
30.	roster	1,2,3,6
31.	midwife	1-5
32.	Midwife API	6
33.	staff	
34.	statisticians	1-5
35.	stock	
36.	Storekeeper	1-5
37.	ticket attendant	1-5
38.	surgeon	1-5
39.	The pathologist	1-5
40.	UH&FPO	1,2,3,6
41.	online payment system api	1,2,6
42.	SMS api	1,2,6

Selected Class List-

1. Accountants
2. Ambulance crew
3. Anesthesiologists
4. Pharmacist
5. Consultant
6. Diabetes medication and vaccine distributor
7. District hospital api
8. District reserve store
9. Thana api
10. Drug (DIMS)
11. Employee
12. Google Maps
13. Head Clerk
14. IEDCR
15. Indoor Management
16. Medical officer
17. Medicine inventory
18. Nurse
19. Nursing supervisor
20. Patient
21. Pharmacy
22. Prescription
23. RMO
24. roster
25. midwife
26. Midwife API
27. Statisticians
28. Storekeeper
29. Ticket attendant
30. Surgeon
31. The Pathologist
32. UH&FPO
33. online payment system api
34. SMS api

Attributes and Methods

Identifications-

Class Name	Attributes	Methods
Patient	1. Patient_id 2. Prescription prescriptions[] 3. Report reports[] 4. name 5. Password 6. NID 7. birth Certificate 8. Phone_no 9. Email_address 10. OTP	1. homepage() 2. registration() 3. view_prescription() 4. get_medicine_reminder() 5. request_prescription_renewal() 6. set_vaccination_reminder() 7. eticket_service() 8. view_test_report() 9. get_profileID() 10. view_hospital_services() 11. change_password() 12. forget_password() 13. call_ambulance() 14. track_ambulance() 15. view_consultancy_schedule() 16. set_location_on() 17. set_location_off() 18. get_referral_info() 19. get_token()
Employee	1. <u>dghs_id</u> 2. <u>nid</u> 3. name 4. password 5. mail 6. phone 7. address 8. job_title	1. login() 2. forget_password() 3. change_password() 4. view_roster()
Accountants	1. DGHS_code 2. budget	1. add_budget() 2. notify_uhfpo() 3. update_budget()
Consultant	1. Speciality	1. view_prescription() 2. generate_prescription() 3. use_DIMS() 4. get_pharmacy_stock_info()
Prescription	1. Patient profile_id	1. add_medicine()

	2. Description 3. prescription_id 4. Medicine_list	2. remove_medicine() 3. update_test()
Indoor Management	1. Bed_availability 2. Mortality_count 3. Assigned_bed	1. increase_available_bed() 2. decrease_available_bed()
Medicine Inventory	1. Medicine 2. Equipment 3. Stock	1. request_drs() 2. add_item() 3. remove_item() 4. stock_viewer()
Nursing Supervisor	1. Nurse assigned_list 2. Mortality_count 3. bed_number 4. token_list	1. assign_nurse() 2. get_patient_e-token() 3. update_mortality_counts() 4. update_bed_availability() 5. real_time_communication() 6. view_prescription() 7. remove_from_duty() 8. check_bed_availability()
Nurse	1. Assigned_bed_no	1. see_assign_bed_num() 2. real_time_communication()
Roster	1. Time 2. Dghs_code	1. modify_roster_accordingly() 2. notify_employee() 3. generate_schedule()
Midwife	1. Birth_count 2. Service_count	1. send_birth_count() 2. update_deliveries_count() 3. track_newborn() 4. track_service()
Ticket Attendant	1. Daily_indoor_ticket_count 2. Daily_outdoor_ticket_count 3. daily_emergency_ticket_count	1. generate_ticket() 2. update_daily_total_ticket()
The Pathologist	1. Tools_&_instruments_list	1. view_report() 2. generate_report() 3. real_time_communication() 4. view_inventory()
UH&FPO	1. UHFPO_Dashboard 2. Budget_report	1. modify_roster() 2. view_financial_report() 3. view_breakout_info()

		4. view_statisticaian's_report() 5. maintain_budget() 6. update_roaster_modification_request() 7. track_pharmacy() 8. track_store() 9. employee_availability_viewer()
Online Payment System	1. Payment_amount 2. Mobile_no 3. OTP 4. is_payment_done	1. verify_payment() 2. verify_mobile_no() 3. send_otp() 4. pay() 5. provide_trans_id()
SMS API	1. OTP 2. Mobile_no 3. is_sms_sent	1. generate_otp() 2. send_sms()
Midwife API	1. midwife_dghs_code	1. post_on_midwife_server()
District Hospital API	1. pid	1. integrate_with_system() 2. get_referral() 3. view_services()
IEDCR	1. Location 2. Disease_type 3. Time	1. fetch_breakout_predictions()
Google Maps	1. gps	1. select_location() 2. fetch_driver's_location() 3. fetch_patient's_location() 4. set_gps()
Statisticians		1. analyze_departmental_performance() 2. view_departmental_resources() 3. maintain_patient_treatment_outcome() 4. generate_departmental_report() 5. generate_resources_report()
RMO		1. modify_roster()

		<ol style="list-style-type: none"> 2. create_roster() 3. real_time_communication() 4. track_store()
Medical officer		<ol style="list-style-type: none"> 1. prescribe() 2. view_prescription() 3. view_available_bed() 4. send_eToken() 5. real_time_communication() 6. report_suspicious_case() 7. get_pharmacy_stock_info() 8. refer_patient() 9. use_DIMS()
Storekeeper		set_medicine_limit() generate_manual_request_for_medicine() track_store() update_store()
Ambulance crew	1. license_number()	<ol style="list-style-type: none"> 1. share_location() 2. call_patient()
Anesthesiologist		<ol style="list-style-type: none"> 1. real_time_communication() 2. get_update_on_surgery_duty_time()
Head Clerk		<ol style="list-style-type: none"> 1. register_employee() 2. maintain_employee_information()
Diabetes medication & vaccine distributor		<ol style="list-style-type: none"> 1. request_stock_from_inventory() 2. add_medicine() 3. give_medicine() 4. view_prescription() 5. view_inventory_stock()
Pharmacist		<ol style="list-style-type: none"> 1. request_stock_from_inventory() 2. add_medicine() 3. give_medicine() 4. view_prescription() 5. view_inventory_stock()
District Reserve store		<ol style="list-style-type: none"> 1. fetch_availability() 2. restock_request()
Thana api		<ol style="list-style-type: none"> 1. get_suspicious_case()
Drug(DIMS)		<ol style="list-style-type: none"> 1. fetch_drug_information()
Surgeon		<ol style="list-style-type: none"> 1. real_time_communication() 2. get_available_staff_llist()

		3. Check_surgical_tools() 4. refer_patient() 5. get_patient_prescription()
Pharmacy	stock medicine_list	add_medication_item() Remove_medication_item() Send_restock_alert_to_store() track_stock()

Analysis

By analyzing the above table we can see that the methods and attributes of 'Diabetes Medication and Vaccine Distributor' and 'Pharmacist' are almost the same. So we can merge these two classes in 1 class and named it '**Medicine and Vaccine Distributors**'.

So, the structure of this new class will be -

Class Name	Attributes	Methods
Medicine and Vaccine Distributors		1. request_stock_from_inventory() 2. add_medicine() 3. give_medicine() 4. view_prescription() 5. view_inventory_stock()

CLASS CARDS

ID1. Patient

Patient	
Attributes	Methods
Patient_id Prescription prescriptions[] Report reports[] name Password NID birth Certificate Phone_no Email_address OTP	homepage() registration() login() view_prescription() get_medicine_reminder() request_prescription_renewal() set_vaccination_reminder() eticket_service() view_test_report() get_profileID() view_hospital_services() change_password() forget_password() call_ambulance() track_ambulance() view_consultancy_schedule() set_location_on() set_location_off() get_referral_info() get_token()
Responsibilities	Collaborators
View hospital services	
Get indoor ticket & get admitted	Medical officer , Consultant, Nursing Supervisor
Get ambulance services	Ambulance Crew
Receive test report	Pathologist
Prescription Manage	Medical Officer, Consultant, Prescription

Get consultancy time	RMO, UH&FPO
Get referral service	Medical Officer, Consultant, Surgeon
Receive medications	Medicine and Vaccine Distributors
Receive prescription renewal and medicine, vaccine reminder	Medical Officer, Consultant
Location integration	Google Maps
Register	
Password recovery	SMS API

ID2. Accountants

Accountants	
Attributes	Methods
DGHS_code budget	add_budget() notify_uhfpo() update_budget()
Responsibilities	Collaborators
Monitor budget	
Notify UH&FPO	UH&FPO

ID3. Ambulance Crew

Ambulance crew	
Attributes	Methods
License_number()	share_location() call_patient()
Responsibilities	Collaborators
Ambulance service	Google map, Patient

ID4. Anesthesiologist

Anesthesiologists	
Attributes	Methods
	real_time_communication() get_update_on_surgery_duty_time()
Responsibilities	Collaborators
Surgery related work	Surgeon

ID5. Consultant

Consultant	
Attributes	Methods
Speciality	view_prescription() generate_prescription() use_DIMS() get_pharmacy_stock_info()

Responsibilities	Collaborators
Manage prescription	patient
Get medicine's information	DIMS api, pharmacy

ID6. Medicine and Vaccine Distributions

Medicine and Vaccine Distributors	
Attributes	Methods
	request_stock_from_inventory() add_medicine() give_medicine() view_prescription() view_inventory_stock()
Responsibilities	Collaborators
Medicine management	District reserve store, patient, pharmacy

ID7. District Hospital API

District Hospital API	
Attributes	Methods
pid	integrate_with_system() get_referral() view_services()

Responsibilities	Collaborators
View services	
Manage Referral	Patient, Medical Officer, Consultant, Surgeon

ID8. District Reserve Store

District Reserve Store	
Attributes	Methods
	check_availability() restock_request()
Responsibilities	Collaborators
Provide restock service	Pharmacy, store

ID9. Thana API

Thana API	
Attributes	Methods
	get_suspicious_case()
Responsibilities	Collaborators
Report suspicious case to police	Medical officer, consultant, surgeon

ID10. Drug(DIMS)

Drug (DIMS)	
Attributes	Methods
	fetch_drug_information()
Responsibilities	Collaborators
Provide drug information	Medical officer, consultant

ID11. Employee

Employee	
Attributes	Methods
dghs_id nid name password mail phone address job_title	login() forget_password() change_password() view_roster()

Responsibilities	Collaborators
Password Recovery	SMS api
View their schedule	UH&FPO, RMO, Roster

ID12. Google Maps

Google Map	
Attributes	Methods
gps	select_location() fetch_driver's_location() fetch_patient's_location() set_gps()
Responsibilities	Collaborators
Pinpoints someone's location	Patient, ambulance crew

ID13. Head Clerk

Head Clerk	
Attributes	Methods
	register_employee() maintain_employee_information()

Responsibilities	Collaborators
Manage all employee related task	All employees

ID14.IEDCR

IEDCR	
Attributes	Methods
Location Disease_type Time	fetch_breakout_predictions()
Responsibilities	Collaborators
Provide possible breakouts prediction	UH&FPO

ID15. Indoor Management

Indoor Management	
Attributes	Methods

Bed_availability Mortality_count Assigned_bed	increase_available_bed() decrease_available_bed()
Responsibilities	Collaborators
Manage bed count	Nursing supervisor

ID16. Medical Officer

Medical Officer	
Attributes	Methods
	prescribe() view_prescription() view_available_bed() send_eToken() real_time_communication() report_suspicious_case() get_pharmacy_stock_info() refer_patient() use_DIMS()
Responsibilities	Collaborators
View or edit prescription	Prescription
Send e-token	Patient, Nursing Supervisor
Real time communication	Pathologist, Nursing Supervisor
Report a suspicious case	Thana api
Refer a patient	Patient, district hospital api
Check the medicine stock and pro-cons	DIMS api, pharmacy

ID17. Medicine inventory

Medicine inventory	
Attributes	Methods
Medicine Equipment Stock	request_drs() add_item() remove_item() stock_viewer()
Responsibilities	Collaborators
Medicine stock track and request for restock	District reserve store

ID18. Nurse

Nurse	
Attributes	Methods
Assigned_bed_no	see_assign_bed_num()
Responsibilities	Collaborators

See assigned bed	Nursing Supervisor
------------------	--------------------

ID19. Nursing supervisor

Nursing supervisor	
Attributes	Methods
Nurse assigned_list Mortality_count Bed_number Token_list	assign_nurse() get_patient_e-token() update_mortality_counts() update_bed_availability() real_time_communication() view_prescription() remove_from_duty() check_bed_availability()
Responsibilities	Collaborators
Add or remove patient & manage bed count	patient
Manage Nurse's Duty	Nurse
Update mortality count	
Real time communication	Medical officer

ID20. Pharmacy

Pharmacy	
Attributes	Methods
stock medicine_list	add_medication_item() Remove_medication_item() Send_restock_alert_to_store() track_stock()

Responsibilities	Collaborators
Add or remove or track stock of medication item	
Send restock request	District reserve store

ID21. Prescription

Prescription	
Attributes	Methods
Patient profile_id Description prescription_id Medicine_list	add_medicine() remove_medicine() update_test()
Responsibilities	Collaborators
Linking Prescription with others	Patient, Medical Officer, Consultant, Nursing Supervisor, Surgeon
Generated by Doctors	Medical Officer, Consultant

ID22. RMO

RMO	
Attributes	Methods
	modify_roster() create_roster() track_store()
Responsibilities	Collaborators
Handle Roster Management	Roster

Manage Medicine Inventory	Medicine Inventory
---------------------------	--------------------

ID23. Roster

Roster	
Attributes	Methods
Time Dghs_code	modify_roster_accordingly() notify_employee() generate_schedule()
Responsibilities	Collaborators
Manage Roster	UH&FPO, RMO

ID24. Midwife

Midwife	
Attributes	Methods
Birth_count service_count	send_birth_count() update_deliveries_count() track_newborn() track_service()
Responsibilities	Collaborators
Update on Midwife API about Maternal and	Midwife API

Newborn Child Information	
Modify Given Service Information	

ID25. Midwife API

Midwife API	
Attributes	Methods
midwife_dghs_code	post_on_midwife_server()
Responsibilities	Collaborators
Get Update about Maternal and Newborn Child Information	Midwife

ID26. Statistician

Statisticians	
Attributes	Methods
	analyze_departmental_performance() view_deparmental_resources() maintain_patient_treatment_outcome() generate_departmental_report() generate_resources_report()

Responsibilities	Collaborators
Generate Overall Statistical Report	UH&FPO

ID27. Storekeeper

Storekeeper	
Attributes	Methods
	set_medicine_limit() generate_manual_request_for_medicine() track_store() update_store()
Responsibilities	Collaborators
Request for Restock	District Reserve Store

ID28. Ticket attendant

Ticket Attendant	
Attributes	Methods
Daily_indoor_ticket_count Daily_outdoor_ticket_count daily_emergency_ticket_count	generate_ticket() update_daily_total_ticket()
Responsibilities	Collaborators

Update Daily Ticket Sales	Accountant
---------------------------	------------

ID29. surgeon

Surgeon	
Attributes	Methods
	get_available_staff_llist() Check_surgical_tools() refer_patient() get_patient_prescription()
Responsibilities	Collaborators
Track Surgical Tools Availability	Medical Inventory
Refer Critical Patient	Patient, District Hospital API
Patient Information Mange	Prescription
Manage Staffs	Anesthesiologist, Nurses

ID30. Pathologist

The Pathologist	
Attributes	Methods
Tools_&_instruments_list	view_report() generate_report() real_time_communication() view_inventory()

Responsibility	Collaborators
Create Test Report	Patient
Communicate with Doctors	Medical Officer, Consultant

ID31. UH&FPO

UH&FPO	
Attributes	Methods
UHFPO_DashBoard Budget_report	modify_roster() view_financial_report() view_breakout_info() view_statisticaian's_report() maintain_budget() update_roaster_modification_request() track_pharmacy() track_store() employee_availability_viewer()
Responsibilities	Collaborators
Roster Manage	Employee, Roster
Budget Control	Accountant
Get Statistical Report	Statistician
Get BreakOut Information	IEDCR
Handle Leave Request	Employee
Track Presence of Employee	Employee

ID 32. Online payment system

Online Payment System

Attributes	Methods
Payment_amount Mobile_no OTP is_payment_done	verify_payment() verify_mobile_no() send_otp() pay() provide_trans_id()
Responsibilities	Collaborators
Authenticate Payment	Patient

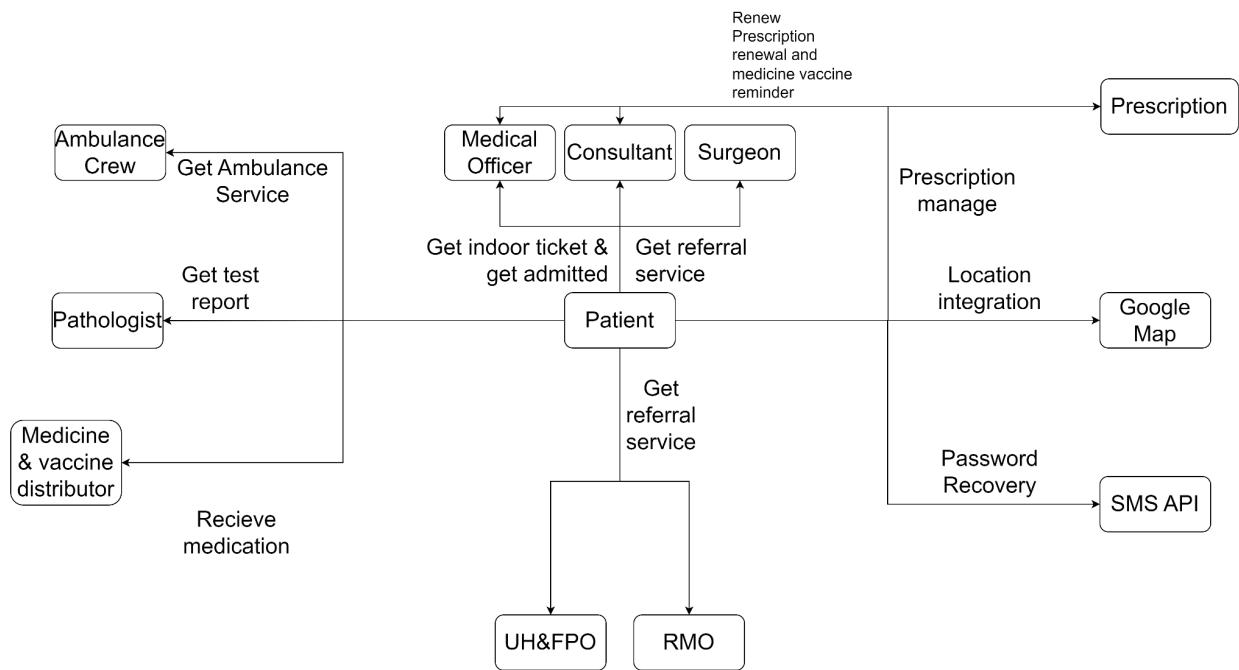
ID33. SMS api

SMS API	
Attributes	Methods
OTP Mobile_no is_sms_sent	generate_otp() send_sms()
Responsibilities	Collaborators
Send OTP SMS	Patient, Employee

CRC DIAGRAM

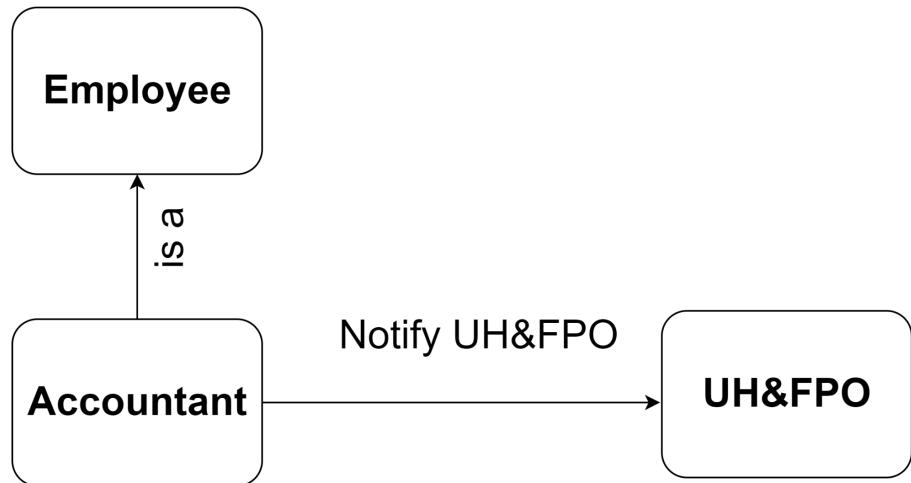
ID1.

Name: Patient



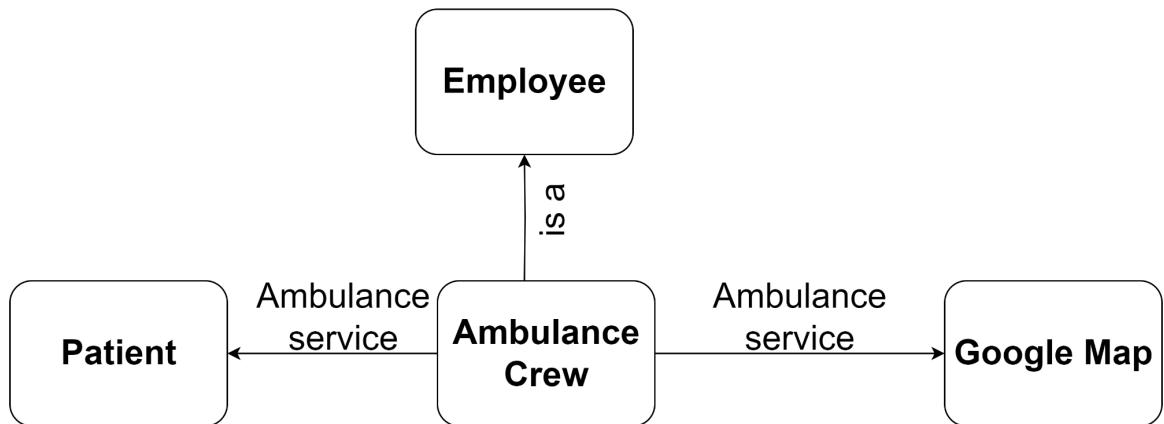
ID2

Name: Accountant



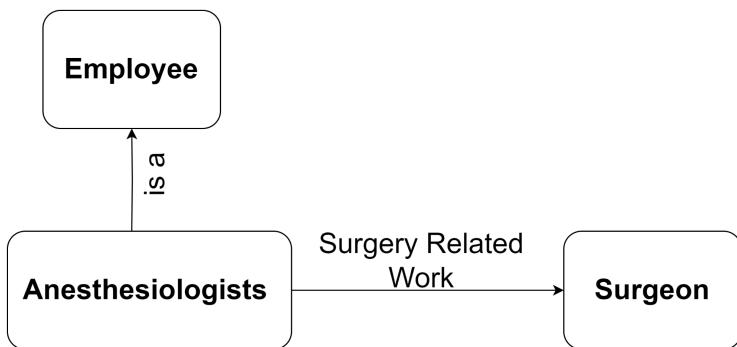
ID3.

Name: Ambulance Crew



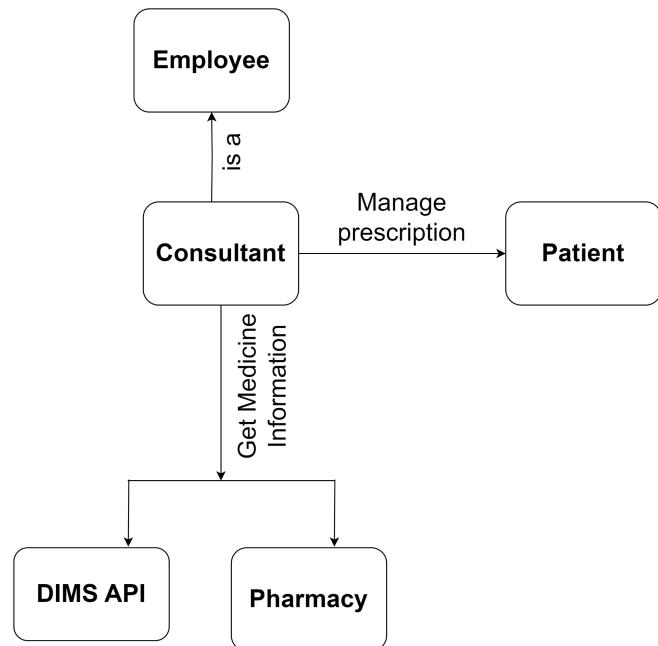
ID4

Name: Anesthesiologist



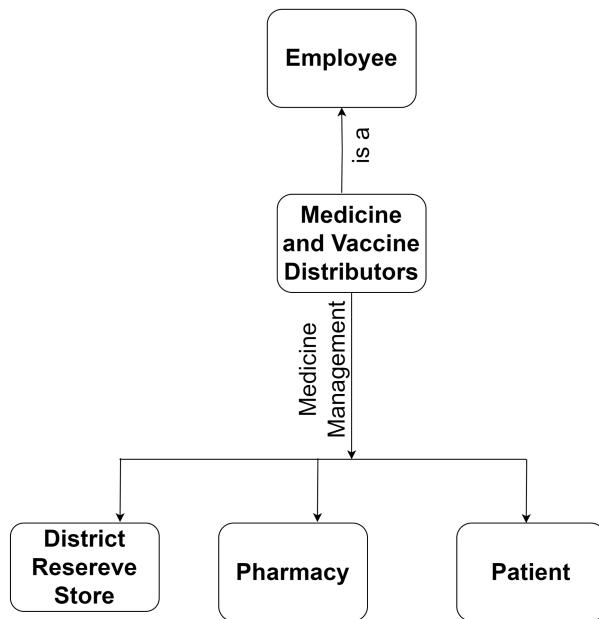
ID5

Name: Consultant



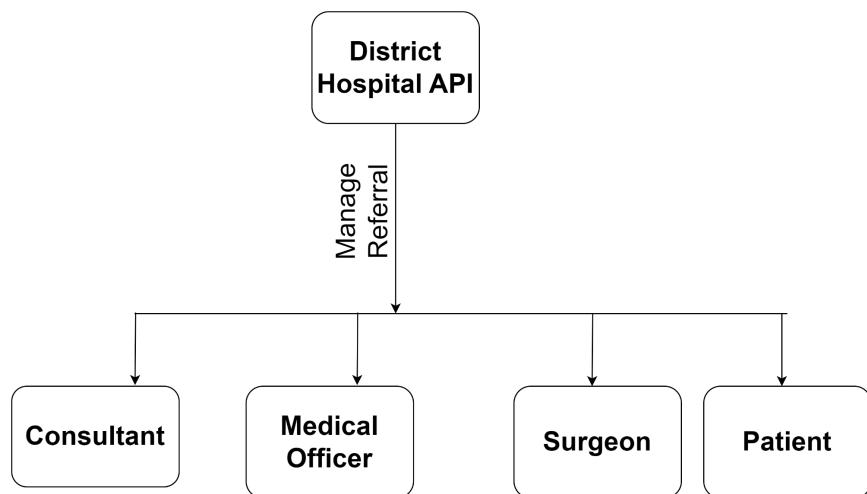
ID6.

Name: Medicine and Vaccine Distributor



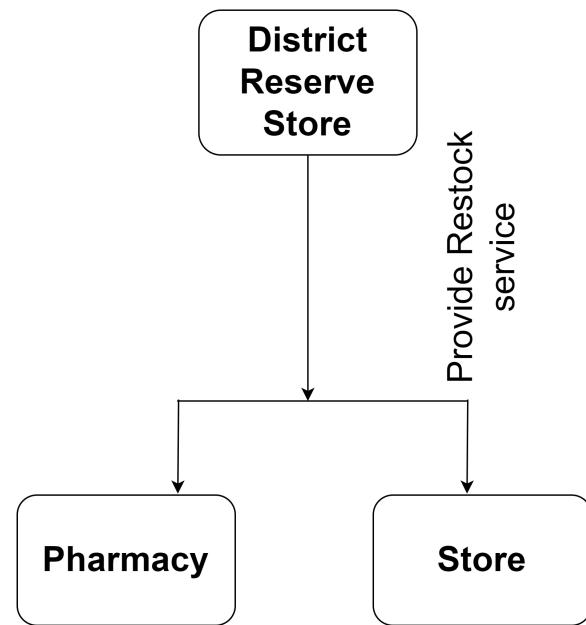
ID7

Name: District Hospital API



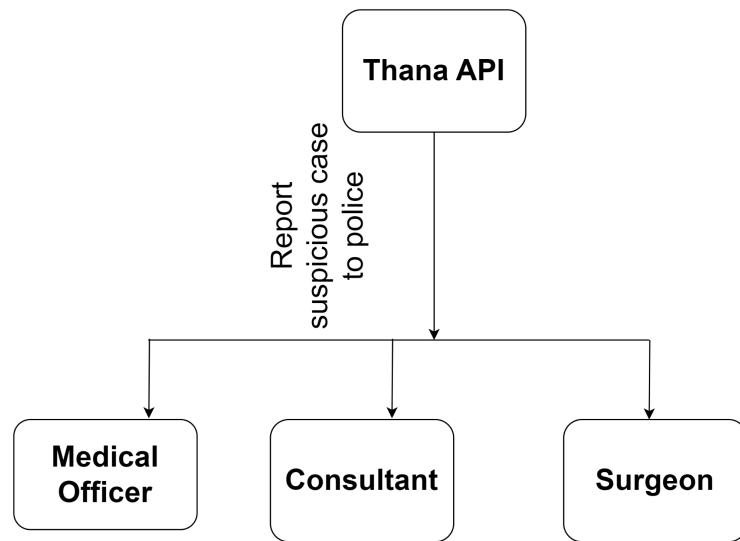
ID8

Name: District Reserve Store



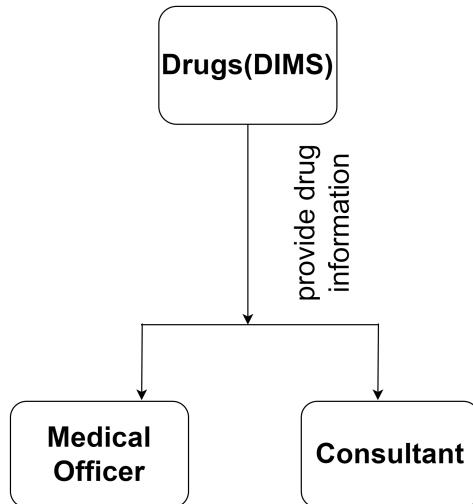
ID9

Name: Thana API



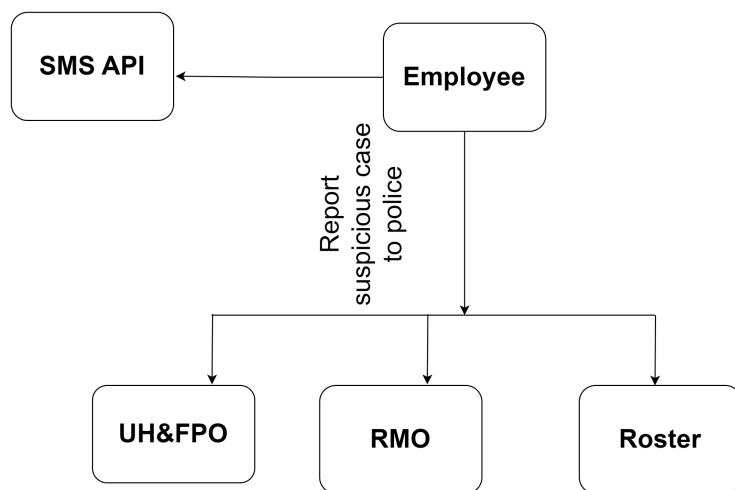
ID10.

Name:Drugs (DIMS)



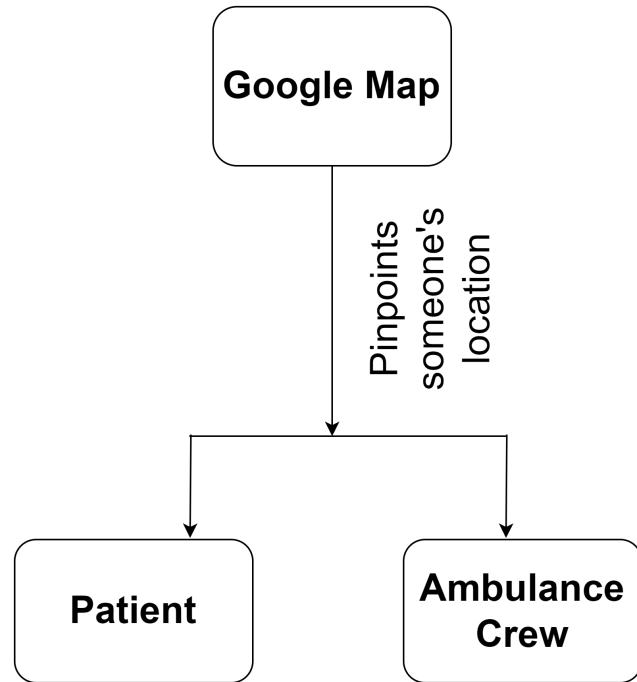
ID11.

Name: Employee



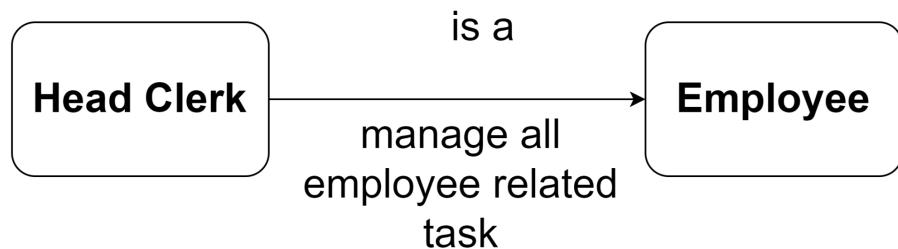
ID12.

Name:Google Map



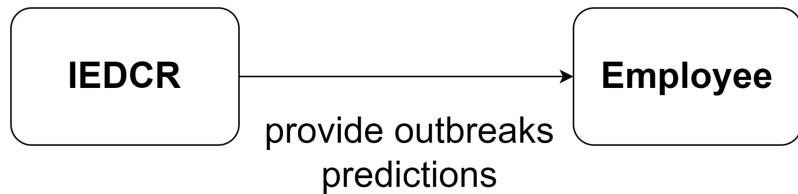
ID13

Name: Headclerk



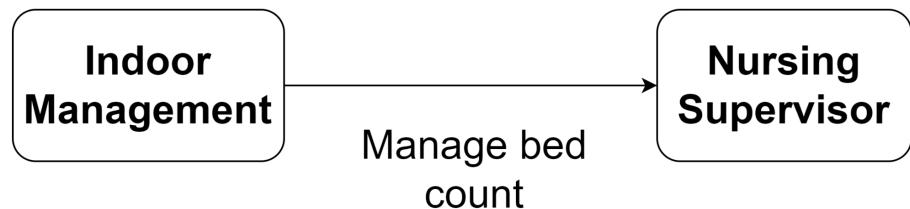
ID14.

Name: IEDCR



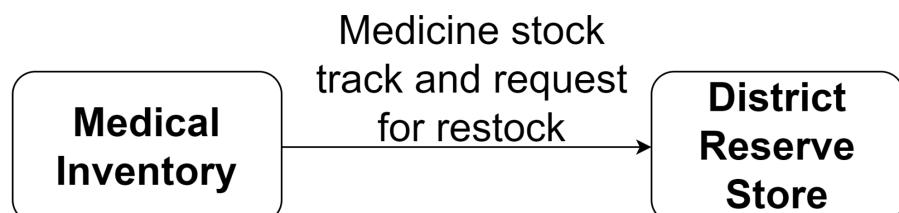
ID15.

Name: Indoor Management



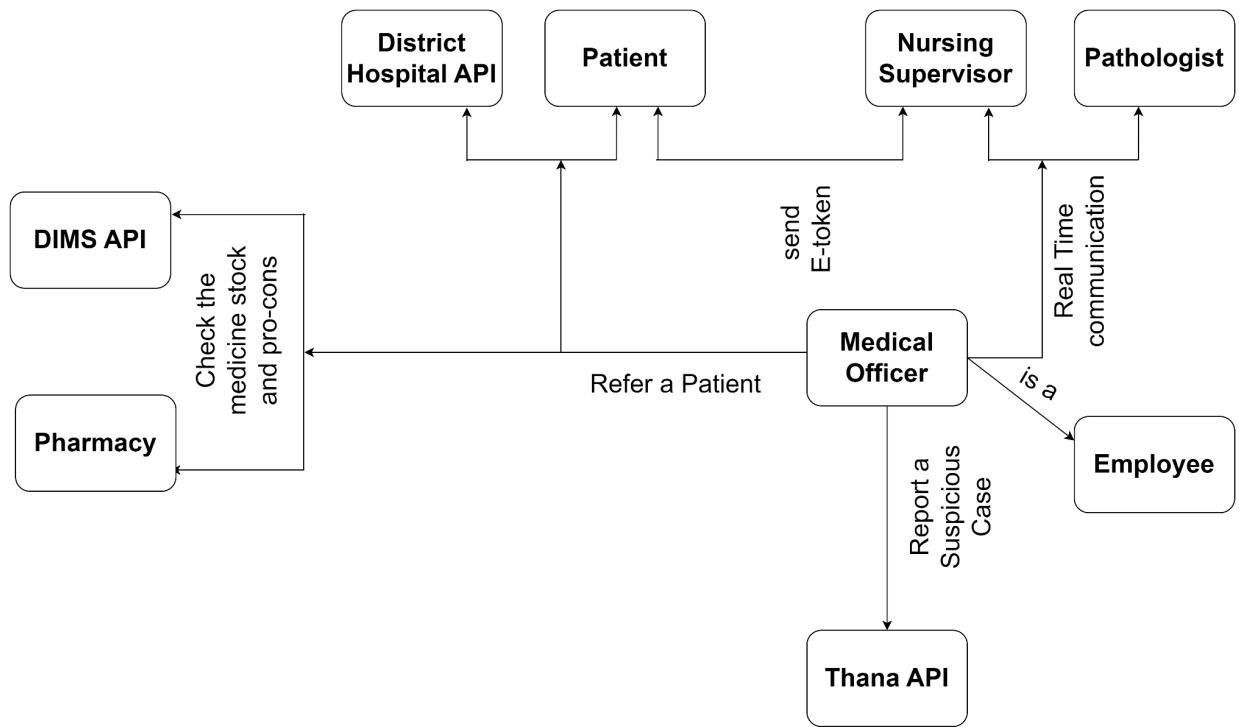
ID16.

Name: Medical Inventory



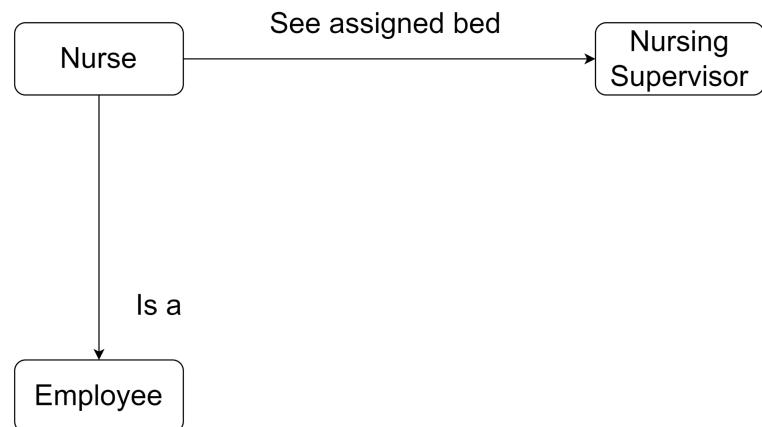
ID17.

Name: Medical Officer



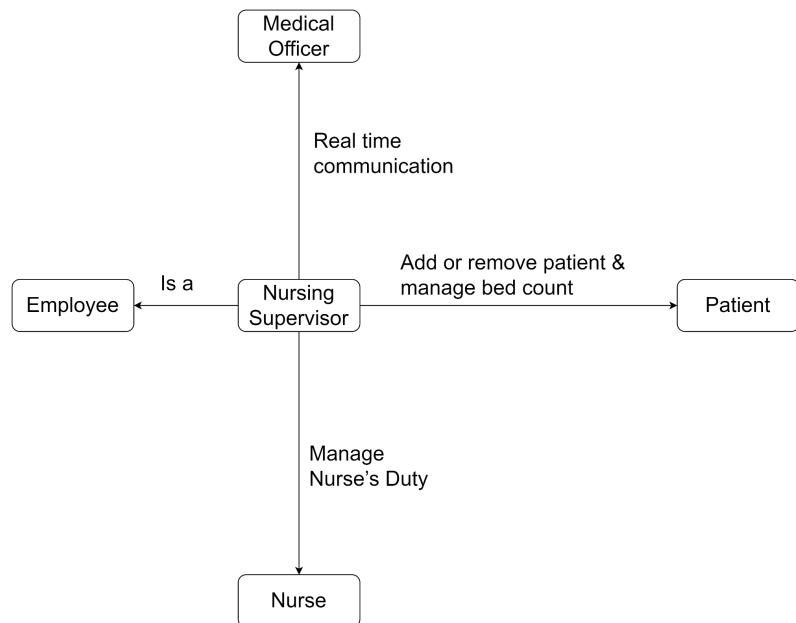
ID18.

Name: Nurse



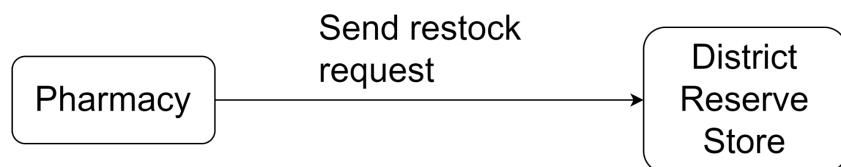
ID19.

Name: Nursing Supervisor



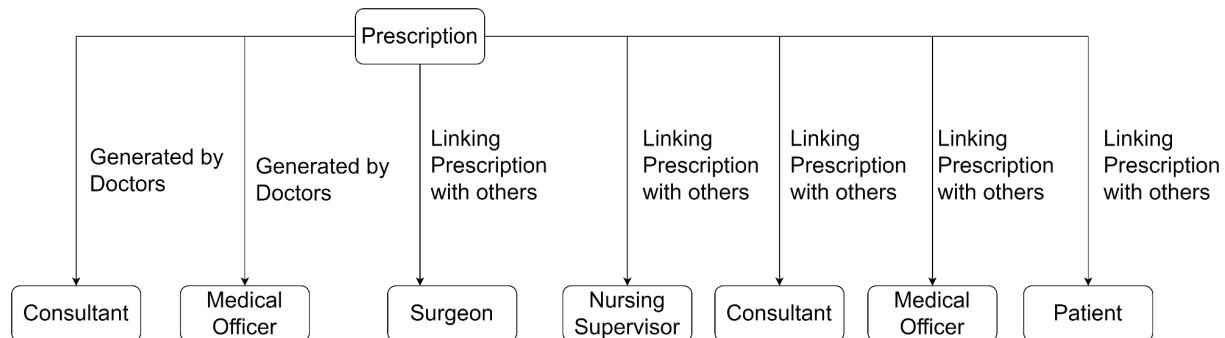
ID20.

Name: Pharmacy



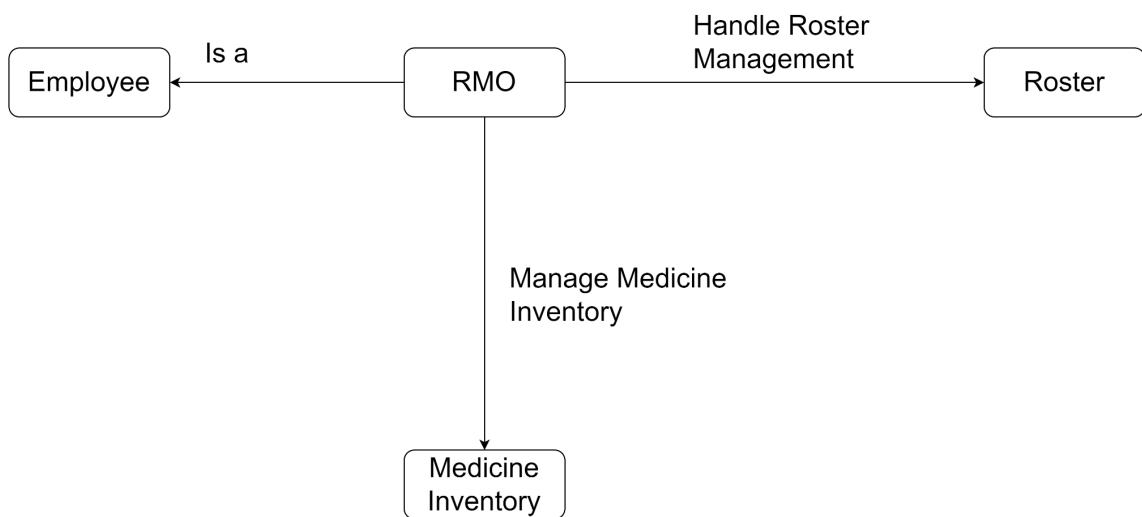
ID21.

Name: Prescription



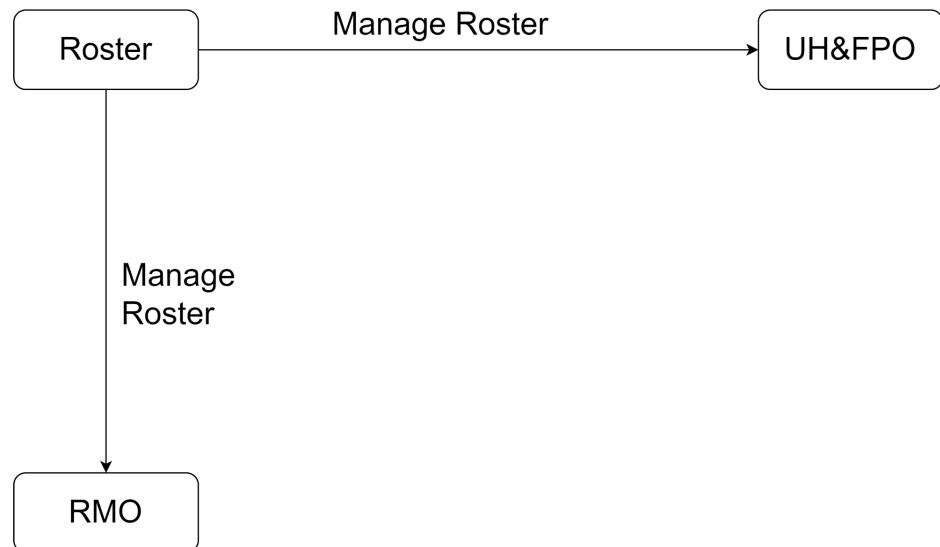
ID22.

Name: RMO



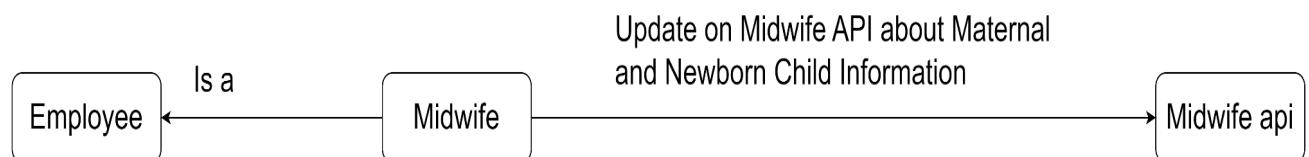
ID23.

Name: Roster



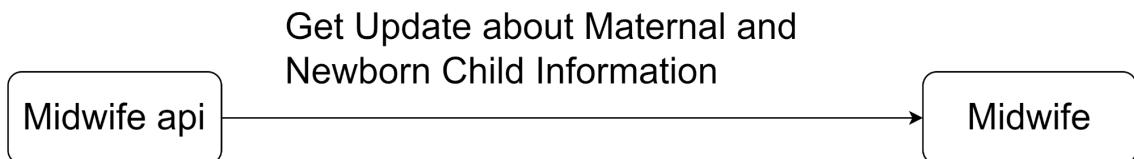
ID24.

Name: Midwife



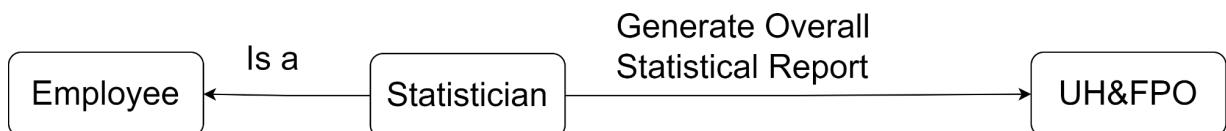
ID25.

Name: Midwife API



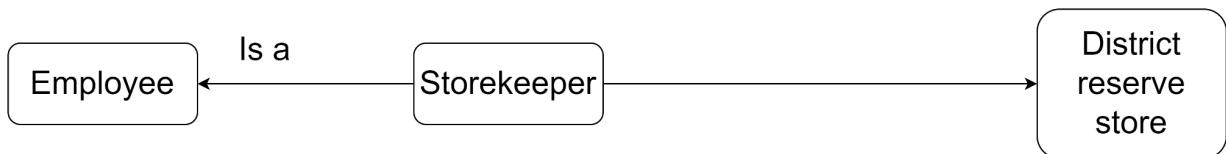
ID26.

Name: Statistician



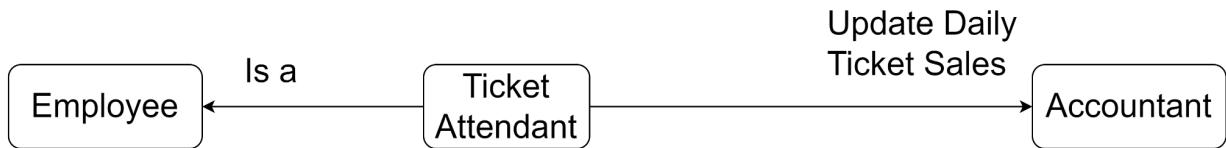
ID27.

Name: Storekeeper



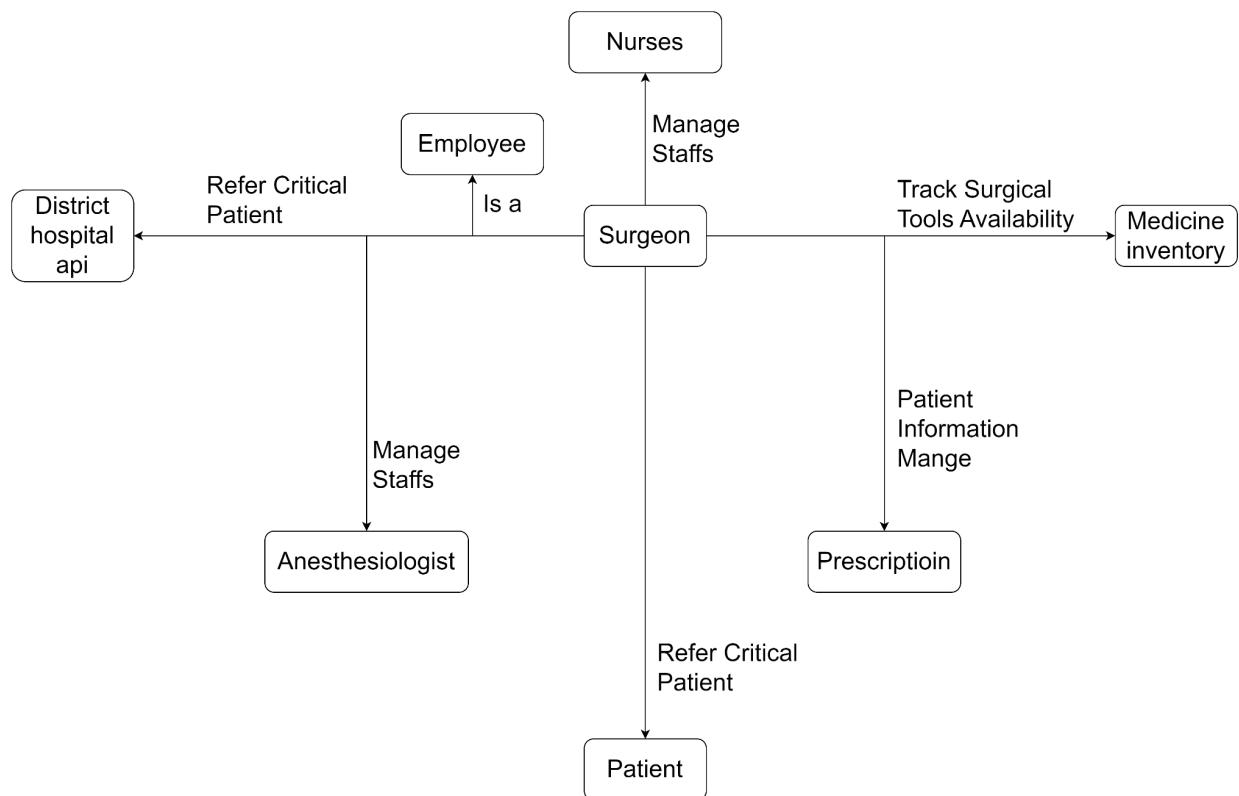
ID28.

Name: Ticket Attendant



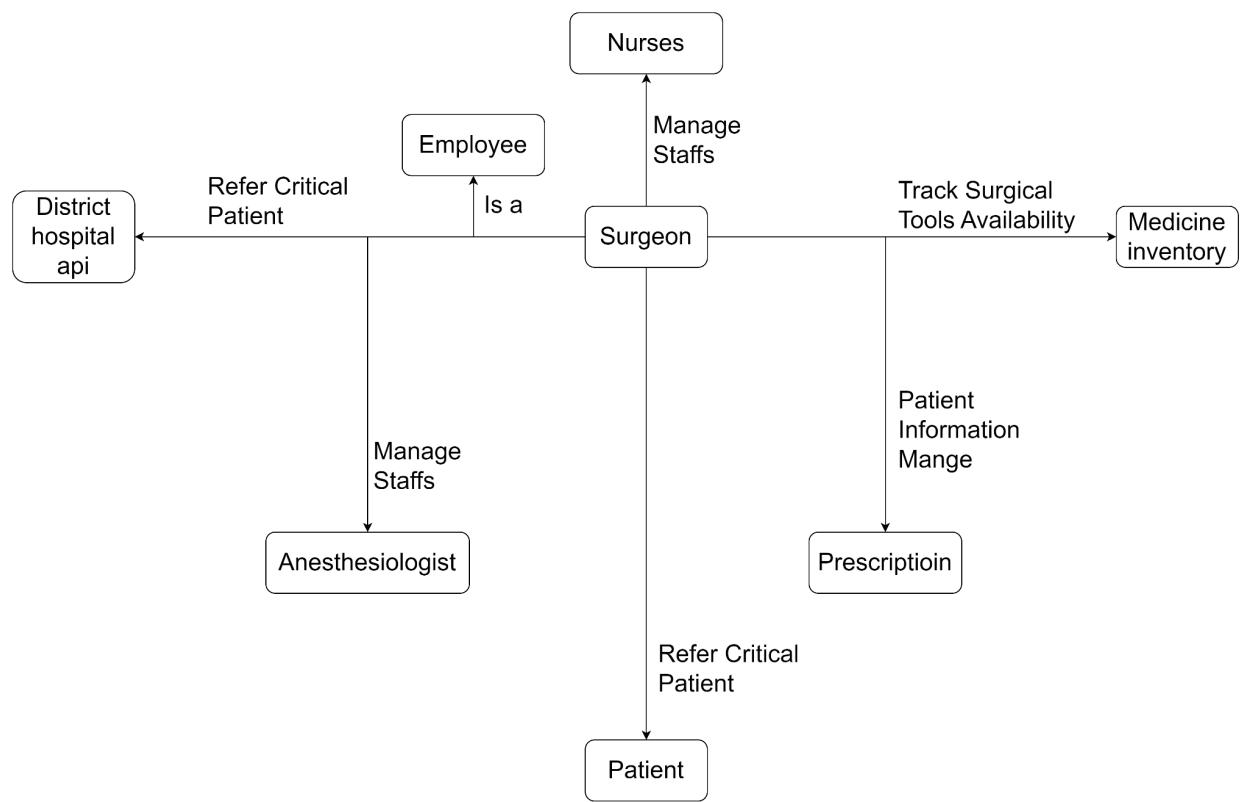
ID29.

Name: Surgeon



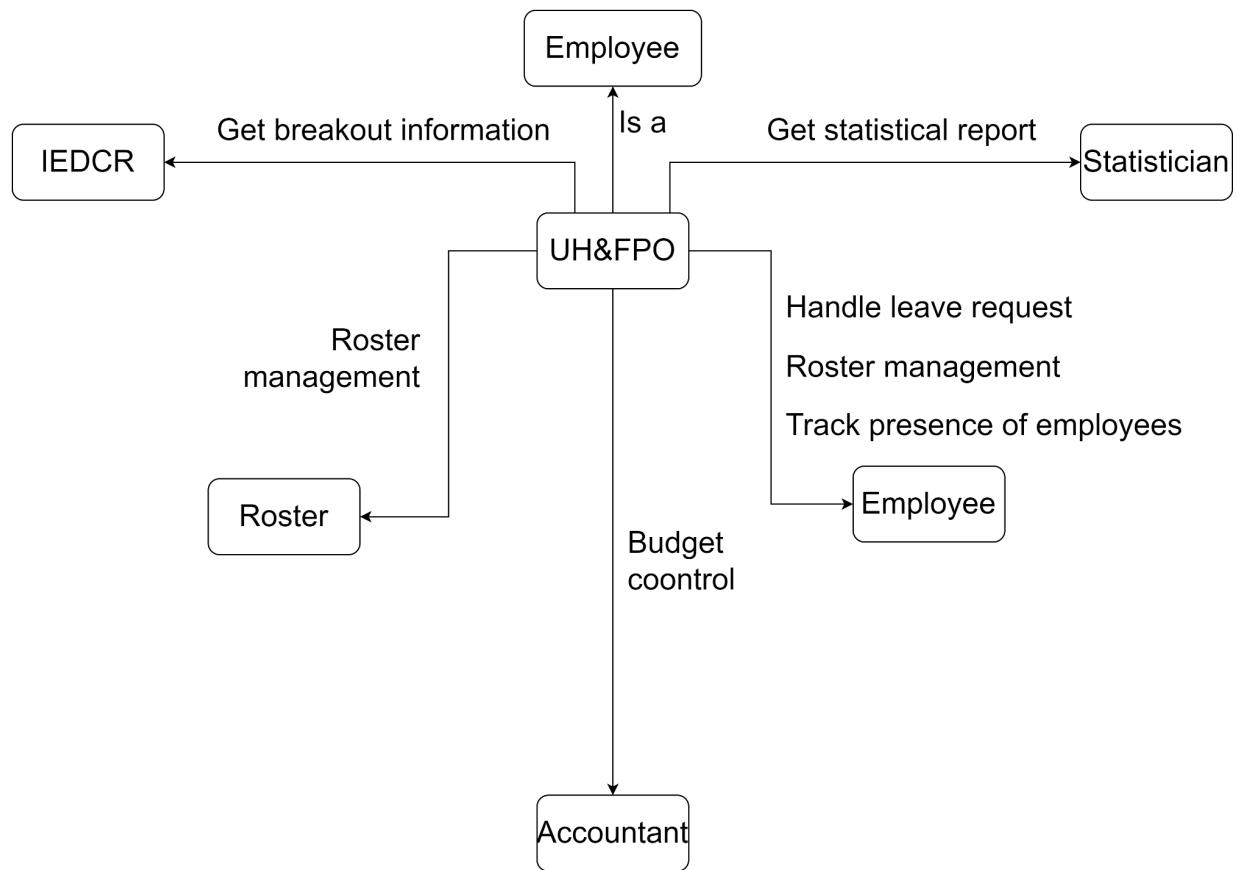
ID30.

Name:Pathologist



ID31.

Name:UH&FPO



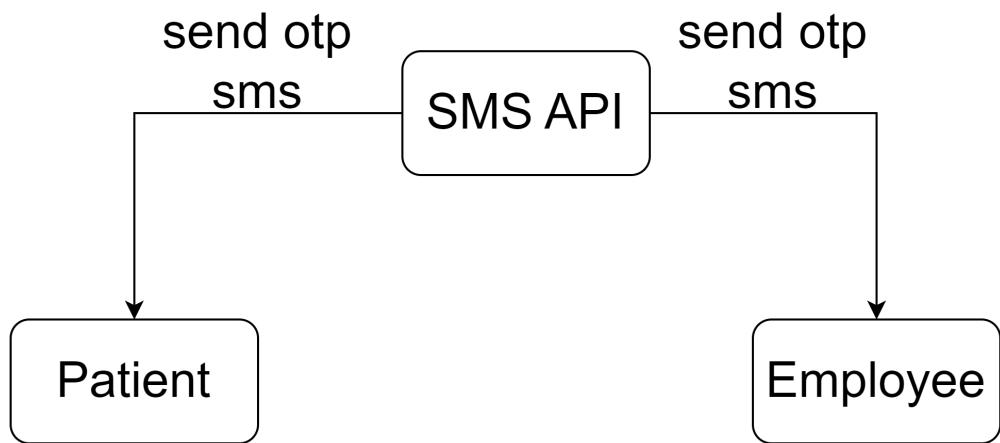
ID32.

Name: Online Payment System



ID33.

Name: SMS API



Behavioral Modeling

STATE TRANSITION DIAGRAM

The behavioral model indicates how software will respond to external events or stimuli. In the context of behavioral modeling, two different characterizations of states must be considered: (1) the state of each class as the system performs its function and (2) the state of the system as observed from the outside as the system performs its function.

State Transition Diagram

One component of a behavioral model is a UML state diagram that represents active states for each class and the events (triggers) that cause changes between these active states.

Serial No	Event	Event Name	Initiator	Collaborator	Associated Methods

1.	Add employees	add_employee	Head clerk	All employees	register_employee()
2.	Log in to the system	login	All classes		login()
3.	View roster	view_roster	All employees	UH&FPO, RMO	view_roster()
4.	View prescription	View_prescription	Medical officer, pharmacist, diabetes & vaccine distributor, consultant, patient	Medical officer, consultant	view_prescription()
5.	Medicine reminder	Medicine_reminder	patient		get_medicine_reminder()
6.	Ambulance call	call_ambulance	patient	ambulance	call_ambulance()
7.	Test record viewer	test_record_viewer			
8.	E-ticket service	e_ticket_service	patient	Online payment system	e_ticket_service()
9.	Budget management	Budget_management	accountant	UH&FPO	add_budget()

10.	Real time communication	Real time_com munication	All employees		real_time _communic ation()
11.	Generate prescription	Generat_prescripti on	Medical officer, consultant, surgeon	patient	generate_prescripti on()
12.	Restock medicine	Restock_medicine	pharmacy	store	request_r estock_fr om_inven tory()
13.	Inform thana	inform_th ana	Medical officer, consultant	patient	report_su spicious_c ase()
14.	Fetch drug information	Fetch_dru g_informa tion	Medical officer, consultant		fetch_dru g_info()
15.	Maintain class information		Head clerk	All employees	maintain_class_info rmation()
16.	prescribe	prescribe	Medical officer, consultant, surgeon	patient	prescribe()
17.	Indoor bed management	Increase and decrease bed available	Nursing supervisor	nurse	increase_a vailable_be d() decrease_a vailable_be d()

		bed			
18.	Nursing management	Assign_nurse, remove_from_duty	Nursing supervisor	nurse	Assign_nurse() remove_from_duty()
19.	Track birth	track_birth	midwife	Midwife api	send_birth_count() update_deliveries_count() track_newborn()
20.	Patient referral	Patient_referral	Medical officer, consultant	Patient, Sadar hospital api	refer_patient()
21.	Password reset	reset_password	All employees & patient(having account)	SMS api	recover_password()
22.	Automated restock request	Automated_restock_request	store	District reserve store api	automated_restock_request()
23.	Create roster	create_roster	UH&FPO, RMO	All other employees	create_roster()
24.	Track store reserve	Track_store_reserve	UH&FPO	store	track_store_reserve()
25.	Breakout notification	view_breakout_info	UH&FPO	IEDCR	view_breakout_info()

26.	Current availability of staffs	Current_availability_of_staffs	UH&FPO	All employees	check_availability_of_staffs()
27.	Check surgical tools	check_surgical_tools	surgeon	store	check_surgical_tool()
28.	Report generation	report_generation	Accountant, statistician	UH&FPO	generate_report()
29.	Change password	change_password	All employees & patients(with account)		change_password()
30.	View medical services	view_medical_services	patient		view_medical_services()
31.	Consultancy time viewer	consultancy_time_viewer	patient	consultant	view_consultancy_time()
32.	View ambulance location	view_ambulance_location	patient	ambulance	view_location()
33.	Renew vaccine	renew_vaccine	Medical officer	patient	renew_vaccine()
34.	Provide e-token	provide_e_token	Medical officer	Nursing supervisor	
35.	Update mortality	update_mortality_c	Nursing supervisor	patient	update_mortality()

	count	ount	r		
1.	View medicine pro cons	view_med icine_pro _con	Medical officer, consultan t	DIMS api	view_medic ine_pro_co n()