Topic: Hospital Management System

Subtopic: Use Case Tables & Diagram

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UC Name	UC-01 User Login
Summary	This use case describes how a user logs into the Hospital Management System using a government-issued ID and a password. After successful authentication, the system redirects users to their respective dashboards based on their assigned roles (like doctor, nurse, receptionist).
Dependency	-
Actors	• **Primary Actor:** Patient, Doctor, Admin, Nurse, Receptionist, Pharmacist, Lab Technician, Radiologist, Financial Manager, Procurement Manager, Housekeepers, HR Manager
Preconditions	• The user must have a valid account in the system. • The system must be connected to the user database to verify credentials. • The user must have a government-issued ID and a password registered in the system.
Description of Main Sequence	1. The user navigates to the Login Page. 2. The system prompts the user to enter their government-issued ID and password. 3. The user enters their credentials and clicks the Login button. 4. The system validates the credentials by checking the database records. 5. If credentials are valid: -The system verifies the user role (like doctor, nurse, patient). -The system redirects the user to their role-specific dashboard (like a doctor sees patient charts, a receptionist sees appointment schedules). -The login session is established and logged audit purposes. 6. The user is now successfully logged into the system and can access relevant functionalities.
Description of Alternative Sequence	1. **Step 4:** If the user enters an incorrect ID or password, the system displays an error message: "Invalid credentials. Please try again.".

	2. **Step 4:** If the user attempts more than 5 failed logins, the system temporarily locks the account for 15 minutes and notifies the user via email/SMS. 3. **Step 4:** If the database is temporarily unavailable, the system displays a message: "Login service is currently down. Please try again later." 4. **Step 5:** If the user is logging in from an unrecognized device, the system triggers multi-factor authentication
Non-Functional Requirements	• **Security: NF-REQ-21:** The system shall log all failed login attempts and notify administrators if unauthorized access is suspected. • **Security: NF-REQ-20:** The system shall implement role-based access control to limit access to patient data based on user roles. • **Security: NF-REQ-19:** The system shall require multi-factor authentication for hospital staff accessing sensitive information. • **Performance: NF-REQ-08:** The system shall retrieve patient records in less than 2 seconds, ensuring quick access to medical data. • **Usability: NF-REQ-01:** The system shall provide an intuitive, user-friendly interface that allows medical professionals to efficiently access core system functions.
Postconditions	• The user is authenticated successfully. • The system identifies the user's role and grants access to the appropriate dashboard. • The login event is recorded in the system logs with a timestamp and user ID.

Author: Marin Tartaraj

UC Name	UC-02 Registration
Summary	This use case describes how an Admin or Receptionist registers new users in the system. The Admin can register any type of user, while the Receptionist can only register patients. The system validates user input, prevents duplicate entries, and generates a random password upon successful registration.
Dependency	-
Actors	• **Primary Actors:** Admin, Receptionist
Preconditions	• The actor must have the necessary permissions to perform registration. • The system must be online and accessible.
Description of Main Sequence	1. Admin or Receptionist selects the "Register New User" option. 2. The system displays the registration form. 3. The actor fills in the user details and selects the user role. 4. The actor submits the registration form. 5. The system validates the entered data. 6. The system checks for duplicate users in the database. 7. If no duplicates are found and data is valid, the system registers the user. 8. The system generates a random password for the new user. 9. The system displays a success message along with the generated password.
Description of Alternative Sequence	**Step 5:** If mandatory fields are missing, the system displays an error message and prompts the user to complete all fields.

	Step 6: If the user already exists, the system prevents duplicate registration and displays an error message. **Step 7:** If any other validation errors occur (like invalid email format), the system provides an error message explaining the issue. **Step 8:** The actor corrects the errors and resubmits the form.
Non-Functional Requirements	• **NF-REQ-01 (Usability Requirement):** The registration process should have an intuitive, user-friendly interface for Admins and Receptionists. • **NF-REQ-02 (Usability Requirement):** Documentation and tutorials should assist Admins and Receptionists in understanding the registration process. • **NF-REQ-03 (Usability Requirement):** A role-based dashboard ensures Admins and Receptionists have access to the registration feature. • **NF-REQ-09 (Performance Requirement):** Quick response time (200ms for database queries) ensures efficient validation and registration. • **NF-REQ-10 (Performance Requirement):** 95% of user interactions should complete within 1 second, ensuring fast registration. • **NF-REQ-19 (Security Requirement):** Multi-factor authentication ensures that only authorized staff can register users. • **NF-REQ-20 (Security Requirement):** Role-based access ensures only Admins can register all users, while Receptionists can only register patients.
Postconditions	• If successful, the new user is registered and receives a randomly generated password. • If unsuccessful, the system displays an error message, and the user is not registered.

Author: Artjol Zaimi

UC Name	UC-03 Appointment Scheduling
Summary	This use case enables patients and receptionists to schedule appointments with doctors through the Hospital Management System. Patients can choose doctors and available time slots, while receptionists can book on behalf of patients during visits or calls. The system checks real-time doctor schedules to avoid conflicts and automatically sends booking confirmations and reminders via SMS or email.
Dependency	-
Actors	**Primary Actors:** Patient, Receptionist
Preconditions	• The user must be logged into the system with a valid patient or receptionist account. • The user must have access rights to use the appointment scheduling feature. • Doctors must be registered and have active schedules available in the system. • The system must be connected to the hospital database for retrieving availability and saving appointments. • Patient contact details must be available for sending notifications.
Description of Main Sequence	1. User (Patient or Receptionist) selects the "Appointment Scheduling" option from their dashboard. 2. The system determines the user's role and: -If Receptionist: Displays a patient search field. -If Patient: Auto-loads their own profile in the background. 3. The user selects or confirms the patient for the appointment: -Receptionist enters/searches the patient ID or name. -Patient skips this step as it's auto-filled. 4. The system loads the patient's basic info and shows the appointment booking form. 5. The user selects: -Department/Specialty -Preferred Doctor (filtered by selected department) 6. The system shows real-time available time slots for the selected doctor (from UC16 and UC20). 7. The user selects a time slot and fills in the purpose of visit.

	8. The system: -Validates input -Locks the selected slot -Stores appointment in the database 9. The system sends a confirmation message to the patient via SMS/email. 10. The appointment appears in the patient's upcoming appointment list.
Description of Alternative Sequence	• Step 3– Patient Not Found: System shows an error if the patient ID or name is incorrect. Suggests retry or correct input. • Step 6 – No Time Slots Available: If the doctor has no free slots, the system shows the next available time or similar doctors. • Step 7 – Missing Info: If required fields are empty or wrong, the system highlights the issues and blocks submission. • Step 9 – Notification Fails: If confirmation can't be sent, the appointment is still saved. System shows a warning and retries later.
Non-Functional Requirements	• **Performance: NF-REQ-10:** The system shall have an uptime of 99.9%, ensuring uninterrupted access to the appointment scheduling feature. • **Availability: NF-REQ-12:** Access to patient records must be secured through role-based authentication. • **Performance: NF-REQ-8:** The system shall retrieve patient records in less than 2 seconds, ensuring quick access to doctor availability and scheduling data.
Postconditions	• The appointment is saved in the system with doctor, patient, date, time, and reason. • The doctor's availability is updated to prevent double-booking. • A confirmation is shown to the user and sent by SMS/email. • The appointment can be viewed, edited, or canceled later (if allowed). • An audit log is recorded with user info and timestamp.

Author: Arlin Bashllari

UC Name	UC-04 Appointment Cancellation
Summary	This use case allows patients and doctors to cancel appointments. The system ensures that users are prompted for rescheduling before finalizing cancellations. It updates schedules and sends notifications to affected users to maintain clear communication.
Dependency	-
Actors	**Primary Actors:** Patient, Doctor
Preconditions	-The patient or doctor must be logged into the system. - There must be an existing appointment to cancel or reschedule.
Description of Main Sequence	1. The patient or doctor initiates the cancellation process. 2. The system prompts the user to reschedule instead of canceling. 3. The user either selects a new date/time or confirms cancellation. 4. The system updates the schedules accordingly. 5. The system sends notifications to affected users. 6. The process is completed successfully.
Description of Alternative Sequence	• If the user does not wish to reschedule, the system proceeds with cancellation and updates records. • If the system encounters an error, it notifies the user and logs the issue for administrators. • If the user attempts to cancel a past appointment, the system denies the request.
Non Functional Requirements	- **Performance : NF REQ-08 :** The system must process cancellations and rescheduling within 5 seconds. - Notifications should be sent instantly upon confirmation. - **Usability: NF REQ-01 :** The interface should be user-friendly and intuitive. - **Availability: NF REQ-12 :** The system should maintain high availability (99.9% uptime).
Postconditions	• The appointment is either canceled or rescheduled. • The schedule is updated accordingly. • Affected users receive notifications. • The system is ready for further appointment modifications.

Author: Shpetim Shabanaj

UC Name	UC-05 Billing Component & Payment Processing
Summary	The hospital billing system enables receptionists to process payments for services offered by the hospital. The system ensures efficient and accurate billing, verifies transactions, and updates financial records.
Dependency	-
Actors	• **Primary Actor:** Receptionist, Pharmacist • **Indirect Actor:** Patient
Preconditions	• The patient has existing records in the system about the services that hospital has provided to him, or a list of medical prescription issued by the doctor on patient's name(or medical portfolio) • The primary actors shall have permission to access this feature.
Description of Main Sequence	1. The receptionist logs into the Billing Component. 2. The receptionist selects the patient and retrieves the list of services provided from his portfolio saved in database. 3. The system displays each service costs and total cost (service cost * quantity). 4. The receptionist confirms the charges with the patient. 5. The patient provides payment details (cash or card). In case of debit card payment, system checks the patient's debit card for the purchase amount and, if approved, creates a debit card purchase authorization number. 6. The system processes the payment and verifies transaction success. 7. Upon successful payment, the system generates a receipt. 8. The system updates financial records automatically, including adding the amount of money received to the total cash in. 9. The receptionist provides the receipt to the patient. **NOTE:** Pharmacist performs the same steps as receptionist.
Description of Alternative Sequence	**Step 5:** If the payment fails, the system notifies the receptionist and the receptionist asks the patient to retry payment or use a different method.

	::: If the system experiences an error, an IT administrator is alerted. **Step 5:** If the patient refuses to pay, hospital policy for unpaid services is followed. **Step 2:** If the system cannot retrieve the patient data, the receptionist shall contact IT administrator. **Step 7:** If the system does not generate the receipt, IT administrator should be notified. **Step 4:** If the patient reports not valid service list on his receipt, proper validation shall undergo.
Non-Functional Requirements	• **Performance: NF-REQ-08:** Payment processing should be completed within 2 seconds. • **Security: NF-REQ-35:** The system must ensure secure transaction processing and encrypt sensitive data. • **Availability: NF-REQ-12:** The billing system must be available 99.9% of the time. • **Usability: NF-REQ-01:** The system should provide a user-friendly interface for receptionists to reduce billing errors.
Postconditions	• The payment is successfully recorded. • The financial records(cash flows) are updated. • The patient receives a receipt. • The billing system ensures no partial payments are accepted. • The system shall be ready for next possible transaction.

Author: Marin Tartaraj

UC Name	UC-06 Profile Management
Summary	This use case allows users to view and update their personal information. The system validates changes before updating the database to ensure data integrity.
Dependency	-
Actors	**Primary Acors:** All Users
Preconditions	1. The user must be logged into the system. 2. The system must be online and accessible.
Description of Main Sequence	1. The user selects "Profile Management" from the menu. 2. The system displays the user's profile details. 3. The user reviews their personal information. 4. If the user wants to make changes, they edit the required fields. 5. The user submits the updated information. 6. The system validates the modifications against predefined rules. 7. If validation is successful, the system updates the database with the new information. 8. The system displays a confirmation message indicating a successful profile update.
Description of Alternative Sequence	**Step 4:** If the user enters missing or incorrect data (like invalid phone number format), the system displays an error message and prompts for corrections. **Step 6:** If validation fails due to business rules violations (like email already exists, invalid characters), the system displays an error message. **Step 7:** If the database update fails due to system issues, the system notifies the user and suggests retrying later.

Non-Functional Requirements	• **NF-REQ-01 (Usability Requirement):** Profile management should be user-friendly for all users. • **NF-REQ-02 (Usability Requirement):** Interactive help should assist users in updating their profiles correctly. • **NF-REQ-03 (Usability Requirement):** A role-based dashboard ensures personalized access to profile management. • **NF-REQ-04 (Usability Requirement):** Accessibility support (keyboard navigation, screen readers) helps users with disabilities. • **NF-REQ-09 (Performance Requirement):** Profile updates should be processed quickly with a 200ms response time for queries. • **NF-REQ-10 (Performance Requirement):** 95% of updates should be completed within 1 second. • **NF-REQ-19 (Security Requirement):** Multi-factor authentication protects sensitive user data from unauthorized access. • **NF-REQ-20 (Security Requirement):** Role-based access ensures users can only update their own profiles.
Postconditions	1. If successful, the user's updated information is stored securely in the database. 2. If unsuccessful, the user is notified of errors and prompted to make corrections.

Author: Shpetim Shabanaj

UC Name	UC-07 Patient Medical Profile
Summary	This use case allows doctors and nurses to search for a patient and access their medical history, lab tests, and radiology results. Patients can directly view specific fields of their own medical portfolio.
Dependency	-
Actors	**Primary Actors:** Doctor, Nurse, Patient
Preconditions	• The patient must have a registered medical profile in the system. • The user (doctor/nurse/patient) must be logged into the system with the appropriate access level, because this use case differs by the level and type of user. • The system must be functional and connected to the hospital database.
Description of Main Sequence	1. The system determines the role of the user after his request for accessing this feature. **DOCTOR and NURSE** 2. The doctor/nurse enters the patient's name or unique ID in the search bar. 3. The system retrieves and displays the patient's profile, including personal details, medical history, diagnoses, prescribed treatments, and test results. 4. If applicable, the system also displays hospitalization details such as admission date, reason for hospitalization, and ongoing medical approach. 5. The doctor/nurse reviews the data and logs out when necessary. **PATIENT** 2. The system automatically retrieves and displays the patient's personal medical data, including past diagnoses, lab/radiology results, and treatment history (only the allowed fields). 3. The patient reviews their information and logs out when done.
Description of Alternative Sequence	• **Step 3**: If the patient does not exist in the system, an error message is displayed.

	• If the user does not have the required permissions, access is denied. • If some medical records are missing, the system notifies the user and suggests updating or verifying the data.
Non-Functional Requirements	• **NF-REQ-08:** The system must retrieve patient records within 2 seconds. • **NF-REQ-20:** Access to patient records must be secured through role-based authentication.
Postconditions	• The doctor/nurse/patient must have the required information displayed.

Author: Nikola Rigo

UC Name	UC-08 Medication Prescription & Viewing
Summary	Allows doctors to prescribe medications through the system. Once a prescription is confirmed, it is stored securely and made available to both patients and pharmacists. Pharmacists receive real-time notifications, review prescriptions, check inventory, and prepare the medication, while patients can view their treatment details.
Dependency	-
Actors	**Primary Actor:** Doctor **Secondary Actor:** Pharmacist, Patient
Preconditions	- The doctor must be authenticated and logged into the system. - The patient's record must exist and be accessible in the system. - The system should have updated inventory information for medications.
Description of Main Sequence	1. **Login & Access**: The doctor logs into the system and navigates to the prescription module. 2. **Input Patient Details**: The doctor enters the patient's ID, full name, and medical condition. 3. **Select Medications**: The doctor selects the appropriate medications from the system and the quantity. 4. **Review & Confirm**: The doctor reviews the prescription details and confirms the prescription. 5. **Store & Notify**: The system securely stores the prescription and sends real-time notifications to pharmacists. 6. **Pharmacist Review**: Pharmacists review the prescription, check inventory availability, and prepare the medication. 7. **Patient Access**: Patients can view their prescription details through the system via their medical profile.
Description of Alternative Sequence	- **Prescription Cancellation**: If the doctor cancels the prescription before confirmation, no data is stored and the process terminates. - **Inventory Issues**: If a prescribed medication is not available, the pharmacist receives an alert or an alternative workflow may be initiated. - **System Errors**: In case of system or network errors during confirmation, the system prompts the doctor to retry or contact support.

Non-Functional Requirements	- **NF REQ-01**: The system provides a user-friendly interface for doctors, pharmacists, and patients to efficiently access prescriptions. - **NF REQ-02**: The system includes tutorials and documentation for training medical staff. - **NF REQ-03**: Role-based dashboards ensure that doctors, pharmacists, and patients have customized views. - **NF REQ-06**: Notification system alerts pharmacists when a prescription is issued. - **NF REQ-08**: Prescription retrieval should take no more than 2 seconds. - **NF REQ-12**: Ensures 99.9% uptime so prescriptions are always accessible. - **NF REQ-19**: Multi-factor authentication required for accessing patient prescriptions. - **NF REQ-20**: Role-based access control restricts prescription visibility based on roles.
Postconditions	- The prescription is permanently stored and is accessible by both patients and pharmacists. - Pharmacists are alerted to review and process the prescription. - An audit trail is maintained for accountability. - The inventory is updated based on the medications dispensed.

Author: Shpetim Shabanaj

UC Name	UC-09 Electronic Health Records Update
Summary	This use case allows doctors to update a patient's medical history by adding new diagnoses, treatments, or conditions. The update applies to both consultations/appointments and hospitalized patients.
Dependency	-
Actors	**Primary Actor :** Doctor
Preconditions	• The patient must have a registered medical profile in the system. • The doctor must be logged into the system with appropriate permissions because this use-case is only for doctors. • The system must be operational and connected to the hospital database.
Description of Main Sequence	1. The doctor navigates to "Patient Records" feature. 2. The doctor searches for the patient by name or unique ID. 3. The system retrieves and displays the patient's medical profile. 4. The doctor selects between "Add Medical Update" and "Update Medical Condition for Hospitalized Patient" 5. In case of "Add Medical Update"→ The doctor enters details such as: - Date of consultation - New medical condition (if applicable) - Description of symptoms/diagnosis - Prescribed treatment (if any) - Additional notes In case of "Update Medical Condition for Hospitalized Patient"→ The doctor enters details such as: - Date and Time of update - Changes in condition - Adjustments to treatment/medication - Any new medical procedures performed 6. The doctor submits the update and then is asked to confirm update. 7. System validates the update or data entered. 8. System saves the change in database.

Description of Alternative Sequence	• **Step 2:** If the patient record does not exist, an error message is displayed. • **Step 6:** If doctor does not confirm changes he will be redirected to the form page. • **Step 7:** If data entered is not valid, the doctor shall be notified and prompted for other data.
Non Functional Requirements	• **NF-REQ-15:** The system shall automatically back up patient records and hospital data every 15 minutes to prevent data loss. • **NF-REQ-20:** The system must ensure role-based access control to prevent unauthorized edits. • **NF-REQ-36:** Changes to a patient's history should be logged for audit purposes.
Postconditions	• The patient's medical record is successfully updated. • The system logs the update with timestamps and doctor's identification. • Nurses and other authorized users can view the updated records.

Author: Arjan Muka

UC Name	UC-10 Lab Test Ordering and Result Upload
Summary	The hospital system enables medical staff (nurses and doctors) to order lab tests for patients and allows lab technicians to upload the results. The system ensures that lab test orders are accurately recorded, and results are updated in the patient's medical profile for review by medical staff.
Dependency	-
Actors	• **Primary Actors:** Medical Staff (Nurse, Doctor), Lab Technician • **Secondary Actor:** Patient
Preconditions	• The patient must have an existing medical profile in the system with relevant medical history. • The medical staff (nurse or doctor) must have permission to order lab tests. • The lab technician must have permission to access the system and upload test results. • The system must be operational and accessible to both medical staff and lab technicians.
Description of Main Sequence	1. The medical staff (nurse or doctor) logs into the hospital system. 2. The medical staff selects the patient's profile from the system database. 3. The medical staff orders the required lab tests for the patient, specifying the type of tests needed. 4. The system records the lab test order and notifies the lab technician of the pending tests. 5. The lab technician logs into the system and retrieves the list of ordered tests for the patient. 6. The lab technician performs the tests and uploads the results into the system.

	7. The system updates the patient's medical profile with the new test results. 8. The system notifies the medical staff that the test results are available for review. 9. The medical staff reviews the test results and takes appropriate action (like updating the patient's treatment plan).
Description of Alternative Sequence	**Step 2**: If the system fails to retrieve the patient's profile, an error is displayed, and the medical staff is prompted to contact the IT administrator. **Step 6:** If the lab technician cannot upload results due to a system error, an error is logged, and the IT administrator is notified. **Step 8:** If the system fails to notify the medical staff of uploaded results, an error is logged, and the IT administrator is notified.
Non Functional Requirements	• NF-REQ-08: Patient records must be retrieved in under 2 seconds for quick access during lab test ordering. • NF-REQ-20: Secure role-based access must be enforced to ensure only authorized medical staff can order tests and lab technicians can upload results. • NF-REQ-18: The system must log all errors (like failed uploads) and notify administrators for immediate resolution. • NF-REQ-12: The system must maintain 99.9% uptime to ensure uninterrupted lab test ordering and result uploads.
Postconditions	• The lab test order is successfully recorded in the system. • The lab test results are uploaded and updated in the patient's medical profile. • The medical staff is notified of the available test results.

	• The system ensures that all actions (ordering, uploading, and reviewing) are logged for audit purposes. • The system is ready for the next lab test order or result upload.

Author: Nikola Rigo

UC Name	UC-11 Radiology & Imaging Ordering and Result Upload
Summary	Enables doctors and nurses to order radiology services for patients and allows radiology technicians to upload imaging results. Once an order is submitted, the system securely transmits the details to the lab, and after processing, results are uploaded and made available for doctor review (and patient access when permitted).
Dependency	-
Actors	**Primary Actors:** Medical Staff (Nurse, Doctor), Radiology Technician **Secondary Actor:** Patient
Preconditions	- The doctor or nurse must be authenticated and logged into the system. - The patient's record exists in the system. - The radiology lab system is accessible for order processing. - Radiology technicians must have valid credentials to upload imaging results.
Description of Main Sequence	1. **Order Placement:** a. Doctors or nurses log into the system and navigate to the radiology ordering module. b. They select the radiology service type (like arm X-ray) and input the patient ID, full name, and desired due time. 2. **Order Submission:** a. The system securely transmits the order details to the radiology lab for processing. 3. **Result Upload:** a. Radiology technicians access the order, search for the patient or doctor details, and upload the imaging result documents into the system. 4. **Notification & Access:** a. Once uploaded, the system automatically notifies doctors

	and (if permitted) patients that the results are available for review.
Description of Alternative Sequence	**Order Modification/Cancellation:** If a doctor or nurse needs to modify or cancel an order before transmission, they can do so, and the system updates or cancels the order accordingly without processing. - **Upload Errors:** If a radiology technician encounters an error during the result upload, the system prompts a retry or notifies support for assistance. - **Permission Issues:** If a patient is not permitted to view the results, the system restricts access accordingly and only notifies the doctor.
Non Functional Requirements	- **NF REQ-01**: Intuitive interface for doctors, nurses, and radiology technicians to place orders and upload results. - **NF REQ-02**: User documentation and tutorials for learning the system quickly. - **NF REQ-03**: Role-based dashboards provide customized views for each actor. - **NF REQ-06**: Notification alerts for new orders and uploaded results. - **NF REQ-08**: Radiology result retrieval should take less than 2 seconds. - **NF REQ-12**: System ensures 99.9% uptime to avoid disruptions. - **NF REQ-19**: Multi-factor authentication required for accessing imaging data. - **NF REQ-20**: Role-based access ensures only authorized personnel can view sensitive medical images.
Postconditions	- The radiology order is stored and transmitted to the lab for processing. - Imaging results are securely uploaded and associated with the patient's record. - Relevant parties (doctors and, if permitted, patients) are notified of the available results. - An audit trail is maintained for all orders and uploads.

Author: Arjan Muka

UC Name	UC-12 Inpatient & Bed Management
Summary	The hospital system enables nurses to manage inpatient care by registering patients, assigning beds, transferring patients between beds, releasing patients, and tracking bed availability. The system ensures efficient bed management and updates bed status in real time to support hospital operations.
Dependency	
Actors	**Primary Actor:** Nurse
Preconditions	• The patient must have an existing medical profile in the system. • The nurse must have permission to access the bed management system and perform actions like registering patients, assigning beds, and releasing patients. • The system must have an up-to-date record of bed availability. • The system must be operational and accessible to the nurse.
Description of Main Sequence	1. The nurse logs into the hospital system. 2. The nurse selects the "Inpatient & Bed Management" module. 3. The nurse registers a new patient into the system (if not already registered) by entering the patient's details. 4. The system checks bed availability and displays a list of available beds. 5. The nurse assigns a bed to the patient, and the system updates the bed status to "occupied." 6. If the patient needs to be transferred to another bed (like due to medical requirements or ward

	changes), the nurse initiates a patient transfer, selects a new bed, and the system updates the bed statuses accordingly (previous bed becomes "available," new bed becomes "occupied"). 7. When the patient is ready to be discharged, the nurse releases the patient from the system, and the system updates the bed status to "available." 8. Throughout the process, the nurse can track bed availability to ensure efficient use of hospital resources. 9. The system logs all actions (registration, bed assignment, transfer, and release) for audit purposes.
Description of Alternative Sequence	**Step 3:** If the system fails to retrieve the patient's profile, an error is displayed, and the nurse is prompted to contact the IT administrator. **Step 5:** If the system fails to update the bed status after assignment, an error is logged, and the IT administrator is notified. **Step 6:** If the system fails to update bed statuses during a patient transfer, an error is logged, and the IT administrator is notified.
Non-Functional Requirements	● NF-REQ-08: Patient records must be retrieved in under 2 seconds for efficient bed assignment. ● NF-REQ-20: Secure role-based access must be enforced to ensure only nurses can manage bed assignments and transfers. ● NF-REQ-12: The system must maintain 99.9% uptime to ensure uninterrupted bed management operations. ● NF-REQ-28: Offline capabilities must be provided to allow emergency bed assignments during network failures.
Postconditions	● The patient is successfully registered in the system (if not already registered).

	● A bed is assigned to the patient, and the bed status is updated to "occupied." ● If a patient transfer occurs, the bed statuses are updated accordingly. ● Upon patient release, the bed status is updated to "available." ● The system ensures that bed availability is accurately tracked and updated in real time. ● All actions (registration, bed assignment, transfer, and release) are logged for audit purposes. ● The system is ready for the next bed management task.

Author: Shpetim Shabanaj

UC Name	UC-13 Nurse Task Assignment
Summary	This use case allows doctors to assign treatment-related tasks to nurses, ensuring efficient coordination for patient care.
Dependency	-
Actors	**Primary actor:** Doctor **Secondary actor:** Nurse
Preconditions	• The patient must have an active medical profile and an active treatment plan. • System must be connected to database for timetable and patient info retrieval.
Description of Main Sequence	1. The doctor navigates to "Nurse Task assignment". 2. The doctor searches for the patient for whom the task is being assigned. 3. The system displays the patient's treatment details. 4. The doctor clicks the button for adding new nurse Task Assignment 5. The doctor fills in task details, including: - Task type (like administering medication, monitoring, wound care) - Date & time of task execution - Priority level (urgent, standard, low) - Additional instructions (if needed) 6. The system retrieves a list of available nurses for the selected time slot. 7. The doctor selects a nurse, and the system confirms the nurse's availability. 8. If available, the system assigns the task and updates the nurse's schedule. 9. The system sends a real-time notification to the assigned nurse with task details. 10. Doctor shall track if the task is completed or not.
Description of Alternative Sequence	• **Step 2:** If the patient profile does not exist, an error message shall be displayed. • **Step 4:** If there are missing fields or problems with validations of fields, the doctor shall be notified and redirected to form page. • **Step 5:** If no nurses are available at the selected time, the system notifies the doctor and suggests alternative time slots or available nurses.

Non Functional Requirements	• The system should provide real-time updates on nurse availability. • **NF-REQ-20:** Secure role-based access should be enforced to ensure only authorized users can assign or view tasks. • **NF-REQ-08**: The task assignment process must be completed in under 2 seconds for efficiency. • **NF-REQ-36:** The system should maintain a log of all assigned and completed tasks for audit and report.
Postconditions	• The task is successfully assigned to the nurse. • The nurse receives the task. • The task is added to the nurse's schedule and patient treatment records.

Author: Nikola Rigo

UC Name	**UC-14 Medication Processing for patients**
Summary	Enables nurses to document the completion of a medication administration task as assigned by a doctor. The nurse enters details into the patient's portfolio, including date & time, medication type, observations, and any adverse reactions or inflammations encountered.
Dependency	-
Actors	Nurse
Preconditions	- The nurse must be authenticated and logged into the system. - A valid task assigned by a doctor exists for either a hospitalized or non-hospitalized patient. - The patient's portfolio is available for updates.
Description of Main Sequence	1. **Task Assignment:** a. After a doctor assigns a medication administration task to a nurse for a specific patient and the nurse completes the task as per the doctor's instructions. 2. **Update Entry:** a. The nurse accesses the patient's portfolio. b. The nurse fills in the update fields such as date & time, type of medication, optional observations/comments, and any inflammations encountered. 3. **Save Update:** a. The update is securely added to the patient's medical portfolio.

Description of Alternative Sequence	- **Incomplete Task:** If the nurse is unable to complete the task, she can mark it as pending with a note for follow-up, which is then visible to the doctor. - **Data Entry Error:** If there is an error during update entry (like missing fields), the system prompts the nurse to correct the input before submission. - **System Failure:** In case of system downtime or errors, the nurse is prompted to retry or log the update later.
Non Functional Requirements	- **NF REQ-01**: User-friendly interface for nurses to log medication administration. - **NF REQ-02**: Tutorials and interactive help features to guide new users. - **NF REQ-03**: Role-based dashboards for nurses and doctors. - **NF REQ-06**: System notifications alert doctors when nurses update patient records. - **NF REQ-08**: Medication record retrieval should take less than 2 seconds. - **NF REQ-12**: 99.9% uptime ensures real-time access to patient medication logs. - **NF REQ-19**: Multi-factor authentication required for nurses accessing medication records. - **NF REQ-20**: Role-based access prevents unauthorized modifications to medical records.
Postconditions	- The completed medication administration update is saved in the patient's portfolio. - An audit trail of the update is maintained. - The update is immediately available for review by the assigned doctor and relevant healthcare team members. - Notifications or alerts may be triggered for any critical observations noted during the update.

Author: Eglis Braho & Artjol Zaimi

UC Name	UC-15 Pharmacy & Stock Management
Summary	This use case allows pharmacists to manage medicine inventory. They can add new medications, update stock levels, handle restocking, and receive alerts for low stock or expiring items. The system ensures accurate tracking and real-time updates to keep the pharmacy well stocked and compliant.
Dependency	-
Actors	**Primary Actor**: Pharmacist
Preconditions	• The pharmacist must be logged into the system with valid credentials and pharmacist role access. • The system must display access to the Pharmacy & Stock Management interface. • The hospital inventory database must be connected and accessible for retrieving, updating, and saving medication records. • The pharmacist must have permission to add, update, or restock inventory items. • Real-time stock tracking and alert features must be active to ensure updates are reflected immediately. • Barcode scanning (if used) and notification services must be operational for efficient data entry and restock alerts.
Description of Main Sequence	1. The pharmacist selects the "Pharmacy & Stock Management" option from their dashboard. 2. The system displays the current list of medications with details like name, quantity, expiration date, and status. 3. The pharmacist chooses to either: -Add new medicine by entering barcode, name, type, expiration date, quantity, price, and restock info. -Update existing medicine details (like quantity, expiration date, price). 4. The system validates all input and saves changes to the inventory. 5. As stock is dispensed (like prescriptions issued), the system automatically reduces inventory quantities. 6. When stock falls below a defined threshold, the system sends low-stock alerts to the pharmacist.

	7. The pharmacist processes restocking by updating relevant fields (quantity, restock date, etc.). 8. The system logs all updates and changes in the inventory tracking log for auditing purposes. 9. The system also sends alerts for upcoming or expired medications, prompting removal or replacement.
Description of Alternative Sequence	**Step 4:** If the medicine already exists in the system, it suggests updating the existing record instead of adding a new one. **Step 5:** If stock isn't reduced after a prescription, the system logs the issue and alerts the pharmacist. **Step 6:** If low-stock or expiry alerts fail, the system saves the changes but warns the user that alerts were not sent. **Step 7:** If another pharmacist is updating the same item, the system prevents changes and asks to try again shortly.
Non Functional Requirements	• **Usability: NF-REQ-01:** The system must have a user-friendly interface for pharmacists to manage stock easily. • **Availability: NF-REQ-012:** The inventory system must be available 99.9% of the time. • **System Error Handling: NF-REQ-18**: Errors in inventory updates must be logged and reported immediately. • **Notification: NF-REQ-05:** The system must notify pharmacists when stock levels fall below the threshold or items are near expiration.
Postconditions	• Medicine stock is added, updated, or restocked successfully in the system. • Low-stock or expiry alerts are generated if conditions are met. • All changes are saved in the hospital inventory database. • The inventory log is updated with timestamp and user info for tracking. • Pharmacists can see the updated inventory in real time.

Author: Arlin Bashllari

UC Name	UC-16 Medical Staff Timetable
Summary	The system provides doctors and nurses with access to their work timetables in a consistent format. Doctors' timetables display patient appointments and schedules for hospitalized patients, while nurses' timetables display tasks assigned by doctors at defined time slots. This feature is automated and does not require user input.
Dependency	-
Actors	**Primary Actor:** Doctor, Nurse
Preconditions	- The system must have predefined schedules for doctors and nurses. - Doctors must have appointments and patient schedules stored in the system. - Nurses must have assigned tasks registered in the system.
Description of Main Sequence	1. The doctor or nurse accesses the system. 2. The system retrieves the relevant timetable data for the specified user. 3. The system displays the work schedule in a consistent format. 4. The user reviews their schedule. 5. The process is completed successfully.
Description of Alternative Sequence	• If no schedule is available, the system notifies the user that no tasks or appointments are currently assigned. • If the system encounters an error in retrieving data, it logs the issue and alerts the administrator.
Non Functional Requirements	- **Performance : NF REQ-08 :** The system must retrieve and display timetables within 3 seconds. - **Availability: NF REQ-12 :** The system should ensure high availability (99.9% uptime). - **Usability: NF REQ-01 ,NF REQ-03 :** The interface should be user-friendly and easily navigable. - The timetable format should be uniform for both doctors and nurses.
Postconditions	• The medical staff has accessed their up-to-date timetable. • The system remains ready for further timetable queries.

Author: Shpetim Shabanaj

UC Name	UC-17 Surgery Planning
Summary	This use case allows doctors to schedule surgeries for patients by selecting a patient, entering surgery details, and ensuring necessary resources are available.
Dependency	-
Actors	**Primary Actor**: Doctor **Indirect Actors:** Nurses, Other team members, Patients
Preconditions	• The patient must have an existing medical profile
Description of Main Sequence	1. The doctor navigates to "Surgery Planning" feature. 2. The doctor searches for and selects the patient requiring surgery. 3. The system displays the patient's medical history and relevant details via UC-09 and allows adding surgery details. 4. The doctor enters surgery details, including: - Type of surgery - Preferred date and time - Assigned operating room (if applicable) - Required surgical team (like lead surgeon, anesthesiologist, assisting nurses) - Necessary equipment and pre-surgical preparations. 5. The doctor submits the form and then is asked to confirm the request. 6. The system verifies the availability of the selected operating room, surgical team, and required equipment via resource allocation. 7. If resources are available, the system finalizes the surgery schedule and updates the patient's medical portfolio. 8. The system sends notifications to assigned staff and marks necessary items as reserved.
Description of Alternative Sequence	**Step 2:** If the patient record is not found, an error message is displayed. **Step 5:** If the doctor does not confirm the prompt, he will be redirected the form's page. **Step 6:** If the required staff and items are not available, the doctor will be notified and redirected to form's page to make changes.

Non Functional Requirements	• **NF-REQ-19:** The system shall require multi-factor authentication for hospital staff accessing sensitive information. • **NF-REQ-01:** The interface should be user-friendly for efficient scheduling. • **NF-REQ-36**: The system must log all scheduled surgeries for auditing purposes.
Postconditions	• The surgery is successfully scheduled and recorded in the patient's profile. • All relevant staff members are notified. • The hospital's scheduling system is updated to reflect the planned surgery. • All necessary items are marked as reserved.

Author: Eglis Braho

UC Name	UC-18 Emergency Handling and Alerts
Summary	The system efficiently manages urgent medical cases by allowing doctors, nurses, administrators, or emergency response teams to flag emergencies as high priority. It overrides standard scheduling, reallocates resources, and sends real-time notifications to ensure a swift and coordinated response while minimizing disruptions to ongoing critical activities.
Dependency	None
Actors	• **Primary Actor:** Doctor (or Nurse) • **Secondary Actors:** Administrator, Emergency Response Team
Preconditions	• The system must have up-to-date resource availability information (rooms, staff, equipment). • The user (doctor, nurse, administrator, or emergency response team member) must be logged into the system with appropriate access rights. • Emergency cases can be flagged by authorized users as high priority.
Description of the Main Sequence	1. A doctor, nurse, administrator, or emergency response team member identifies an emergency medical situation. 2. The actor flags the case as high priority in the system. 3. The system immediately overrides the current scheduling protocols to prioritize the emergency case. 4. The system reallocates available staff, rooms, and equipment to accommodate the emergency. 5. Real-time notifications are sent to all relevant personnel, including the emergency response team, doctors, nurses, and administrators. 6. The system dynamically adjusts ongoing appointments, rescheduling or reallocating resources without disrupting critical activities. 7. If necessary, doctor-patient meetings are rescheduled to make room for the emergency. 8. The emergency handling mechanism remains active until the case is resolved and normal operations are restored. *9.* The receptionist monitors and updates dispatch details as needed.
Description of the Alternative	**Step 2-**If the system is down or encounters a failure, the actor manually flags the emergency and notifies the response team

Sequence	via alternate communication methods (like phone, pager). **Step 4-**If resources (like rooms, staff) are unavailable, the system alerts the actor, who can then make manual adjustments or request additional resources from other departments.
Non functional requirements	**Performance** • NF-REQ-11: The system shall handle peak traffic, ensuring resources are reallocated without performance degradation during emergencies. **Security** • NF-REQ-20: The system shall implement role-based access control (RBAC) to manage access to emergency handling features based on user roles. **Availability** • NF-REQ-12: The system shall have an uptime of 99.9% to ensure availability during critical emergencies. • NF-REQ-27: The system shall provide offline capabilities for critical functionalities, ensuring emergency operations can continue even during system downtime. **Usability** • NF-REQ-06: The system shall include a notification center for critical system alerts, including emergency alerts.
Postconditions	• The emergency case is flagged as high priority, and resources (staff, rooms, equipment) are reallocated to the emergency task. • Relevant personnel receive real-time notifications and act according to the emergency protocol. • The schedule is dynamically adjusted, with non-critical meetings rescheduled as needed to accommodate the emergency. • The system logs all actions and adjustments made during the emergency handling process for future review.

Author: Artjol Zaimi

UC Name	UC-19 Room Cleaning Management
Summary	This use case allows patients, receptionists, and nurses to request room cleaning. Requests are prioritized by urgency and sent to housekeeping staff, who update the status as tasks are completed.
Dependency	
Actors	**Primary Actor:** Patient, Nurse, Housekeeping Staff **Secondary Actors:** Receptionist
Preconditions	• The user must be logged in with the correct role (patient, receptionist, nurse, or housekeeping staff). • The system must have access to valid room data and allow submitting or managing cleaning requests. • The hospital database and notification service must be active. • Housekeeping staff must be able to access the cleaning request list.
Description of Main Sequence	1. User (Patient, Receptionist, or Nurse) selects the "Room Cleaning Request" option from their dashboard. 2. They select the room and optionally add cleaning type, urgency, and notes. 3. The request is submitted and added to the action stack. 4. If marked high priority, it goes to the top of the list. 5. Housekeeping receives a notification and views the request. 6. They mark it as "In Progress" when cleaning starts and "Completed" when done. 7. The system updates the request status and logs the action.
Description of Alternative Sequence	• **Step 2 –** Missing or Invalid Input: If the user doesn't fill in the required fields, the system shows an error and blocks submission. **Step 3** – Duplicate Request: • If the same room already has a pending request, the system notifies the user and prevents duplicate entries. • **Step 5** – Notification Failure: If the housekeeping staff don't receive the alert, the request still appears in their dashboard list. • **Step 6 –** Request Not Started:

	If the request is not updated to "In Progress" after a set time, the system flags it as delayed.
Non Functional Requirements	• **Usability: NF-REQ-01:** The system shall provide an intuitive and easy-to-use interface for submitting and managing room cleaning requests. • **Performance: NF-REQ-08:** The system shall retrieve and update the cleaning request stack within 2 seconds to ensure responsive user interaction. • **Availability: NF-REQ-12:** The room cleaning request feature shall be available 24/7 with a minimum of 99.9% uptime. • **Notification: NF-REQ-12:** The system shall notify housekeeping staff of new high-priority cleaning tasks in real time via dashboard alerts.
Postconditions	• The cleaning request is successfully saved in the system, tagged with all relevant metadata (ID, timestamp, requester, priority). • The request appears in the dynamic action stack, visible to all housekeeping staff. • High-priority requests are positioned at the top of the stack. • Housekeeping staff can see and update the request status in real time. • Once marked “Completed,” the request is removed from the active queue and archived. • All actions (submission, progress, completion) are logged for traceability.

Author: Marin Tartaraj

UC Name	UC-20 Staff Scheduling
Summary	This use case allows managers to create and display work schedules for doctors, nurses, and other staff. The system detects scheduling conflicts and notifies managers about availability changes affecting appointment scheduling.
Dependency	
Actors	**Primary Actor:** Manager
Preconditions	1. The manager must be logged into the system. 2. The system must have access to staff data (names, roles, etc.). 3. The system must be online and accessible.
Description of Main Sequence	1. The manager selects "Staff Scheduling" from the menu. 2. The system displays the staff scheduling interface. 3. The manager inputs schedule details for staff, including names, roles, shifts, on-call hours, and days off. 4. The system validates the schedule for conflicts (like overlapping shifts). 5. If there are no conflicts, the system saves the schedule. 6. Once the schedule is finalized, the system displays the schedule to the staff in a standardized format. 7. If a change in a doctor's shift affects appointment scheduling, the system triggers an alert to notify the manager of the potential conflict.
Description of Alternative Sequence	**Step 4:** If the manager schedules a shift that overlaps with an existing shift, the system detects the conflict and displays an error message. **Step 5:** If the schedule change affects a doctor's availability for appointments, the system triggers an alert and prompts the manager to confirm or modify the change.

	Step 6: If required information (like staff role, shift time) is missing, the system displays an error message and requests completion.
Non-Functional Requirements	• **NF-REQ-01 (Usability Requirement):** A user-friendly scheduling interface is required for Managers. • **NF-REQ-03 (Usability Requirement):** A role-based dashboard provides different scheduling views for staff members. • **NF-REQ-05 (Usability Requirement):** Notifications should alert staff about schedule changes and conflicts. • **NF-REQ-06 (Performance Requirement):** The system must support 1000+ concurrent users to handle scheduling efficiently. • **NF-REQ-09 (Performance Requirement):** Scheduling queries should have a quick response time (200ms). • **NF-REQ-10 (Performance Requirement):** 95% of interactions, including schedule changes, should complete within 1 second. • **NF-REQ-11 (Performance Requirement):** The system must handle peak traffic during shift changes without performance issues. • **NF-REQ-27 (System Downtime Management Requirement):** If downtime is scheduled, real-time notifications should be displayed to managers.
Postconditions	1. If successful, the schedule is stored and displayed to staff members. 2. If unsuccessful (like due to conflicts), the system displays error messages and prompts the manager to make corrections.

Author: Arlin Bashllari

UC Name	UC-21 Report Generation
Summary	The system provides managers with the ability to generate reports based on various filters to meet their specific requirements. Reports can include predefined filters such as staff performance, patient admission trends, bed occupancy rates, emergency cases, pharmacy inventory levels, and financial data. Managers can also apply custom filters like date ranges, departments, or specific criteria. The system generates reports in user-friendly formats, including tables, charts, or graphs, ensuring that managers can make informed decisions based on the data.
Dependency	-
Actors	**Primary Actor:** All Managers
Preconditions	- The manager must have the necessary permissions to access reports. - The system must have stored data relevant to the selected filters.
Description of Main Sequence	1. The manager logs into the system. 2. The manager selects predefined filters or applies custom filters. 3. The system retrieves relevant data based on the selected criteria. 4. The system compiles and processes the data. 5. The system generates a report in the chosen format (table, chart, or graph). 6. The manager reviews and analyzes the report. 7. The process is completed successfully.
Description of Alternative Sequence	• If no data is found for the selected filters, the system notifies the manager and suggests adjusting the criteria. • If an error occurs during data retrieval, the system logs the issue and alerts the administrator. • If the manager does not have the necessary permissions, the system denies access and provides an error message.
Non Functional Requirements	- **Performance : NF REQ-08 :** The system must generate reports within 5 seconds.

	- **Usability: NF REQ-01 :** Reports should be presented in an easy-to-read format (tables, charts, graphs). - **Reliability:** The system must ensure data accuracy and consistency. - **Flexibility:** The reporting module should support a high level of customization. - **Availability: NF REQ-12 :** The system must be available 99.9% of the time to ensure uninterrupted report generation.
Postconditions	• The manager successfully generates and accesses the report. • The system remains ready for further report requests. • The generated report is available for download or further analysis.

Author: Arlin Bashllari

UC Name	UC-22 Library and Literature Search
Summary	The system provides a robust digital library and literature search feature for doctors and nurses. This feature allows healthcare professionals to access various medical resources, including research papers, journals, eBooks, clinical guidelines, and other relevant publications. Users can search using keywords, topics, authors, or publication dates to efficiently locate materials. Additional features include bookmarking and downloading literature, promoting knowledge-sharing and evidence-based medical practices.
Dependency	-
Actors	1. Doctor 2. Nurse
Preconditions	- Users must have access permissions to the digital library. - The system must contain indexed literature for searching.
Description of Main Sequence	1. The doctor or nurse accesses the digital library. 2. The user enters search criteria (keywords, topics, author, publication date, etc.). 3. The system retrieves and displays relevant literature. 4. The user reviews and selects the desired material. 5. The user can bookmark or download selected literature. 6. The process is completed successfully.
Description of Alternative Sequence	• If no results match the search, the system suggests related materials. • If the system experiences an error, it logs the issue and alerts the administrator. • If the user does not have the necessary permissions, access is denied.
Non Functional Requirements	- **Performance : NF REQ-08 :** The system must return search results within 3 seconds. - **Maintainability:** The library database should be regularly updated. - **Usability: NF REQ-01 :** The interface should be user-friendly and support advanced search capabilities.

	- **Security:** The system must ensure secure access to licensed content. - **Manageability:** The library manager must be able to add, update, and delete literature records.
Postconditions	• The user successfully retrieves and accesses relevant literature. • The system remains ready for further searches. • Any bookmarks or downloads are stored for future reference.

Author: Eglis Braho

UC Name	UC-23 Library and Literature Management
Summary	The system offers a comprehensive library management feature, enabling the Library Manager to oversee medical literature, journals, research papers, and reference materials. It allows adding, updating, deleting entries, uploading files, and maintaining an up-to-date database of medical resources.
Dependency	None
Actors	• **Primary Actor:** Library Manager • **Secondary Actors:** System Administrator (for system maintenance and managing permissions), Other Library Staff (for assisting with day-to-day tasks)
Preconditions	• The Library Manager must have proper login credentials to access the library management system. • The system must be connected to the database for storing and retrieving literature data. • File upload capability must be enabled and functioning correctly.

Description of the Main Sequence	1. The Library Manager navigates to the Library Management Module.
	2. The system presents options to Add New Literature, Update Existing Literature, or Delete Literature.
	3. If adding new literature:
	  • The Library Manager enters details like title, author, publication date, category, keywords, and description.
	  • The Library Manager uploads a file (PDF version, research document, or link to an online resource) to the system.
	  • The system saves the new literature entry into the database.
	4. If updating existing literature:
	  • The Library Manager selects a piece of literature to update.
	  • The system presents the current details, allowing the Library Manager to replace the outdated file or append supplementary information.
	  • The updated literature is saved to the system.
	5. If deleting literature:

	• The Library Manager selects the outdated or irrelevant piece of literature to remove. • The system prompts for confirmation before deleting the record and associated files. • The literature is deleted from the system and the database is updated.
Description of the Alternative Sequence	**Step 3-**If the file upload fails (like large file size or incompatible format), the system will notify the Library Manager and allow them to retry with a valid file. **Step 2-**In case of system downtime, the Library Manager may not be able to access the system to make changes. The system will notify the Library Manager of downtime, and the tasks will resume when the system is back online.
Non functional requirements	• NF-REQ-01 (Usability): The system shall provide an intuitive, user-friendly interface for managing literature, minimizing the need for extensive training for the Library Manager. • NF-REQ-03 (Performance): The system shall allow for quick literature retrieval, with search functionality that can return results in less than 2 seconds. • NF-REQ-06 (Performance): The system shall support the upload and retrieval of large files (PDFs, research documents) without significant performance degradation. • NF-REQ-11 (Availability): The system shall ensure a 99.9% uptime to allow the Library Manager continuous access for adding and updating literature. • NF-REQ-19 (Security): The system shall require role-based authentication to ensure only authorized personnel can add, update, or delete literature. • NF-REQ-20 (Security): The system shall ensure data encryption for any uploaded files to maintain confidentiality and prevent unauthorized access.
Postconditions	• The system updates the database with the newly added, updated, or deleted literature. • All changes (additions, updates, deletions) are logged for auditing purposes.

	• The system reflects the current and accurate status of the medical literature available in the library.

Author: Arjan Muka

UC Name	UC-24 Vaccination Management
Summary	The hospital system enables patients to manage their vaccination records by viewing their vaccination history, scheduling new vaccinations, and receiving reminders for upcoming vaccinations. The system ensures that patients can easily access their vaccination information and stay up-to-date with their immunization schedule.
Dependency	-
Actors	• **Primary Actor:** Patient • **Secondary Actor:** Nurses
Preconditions	• The patient must have an existing medical profile in the system with vaccination records. • The patient must have access to the hospital system (like via a patient portal or mobile app). • The system must be operational and accessible to the patient. • The system must have an up-to-date vaccination schedule and reminder settings configured.
Description of Main Sequence	1. The patient logs into the hospital system (like through a patient portal or mobile app). 2. The patient selects the "Vaccination Management" module. 3. The patient chooses to view their vaccination history, and the system displays a list of all previous vaccinations, including dates and types of vaccines received. 4. The patient selects the option to schedule a new vaccination, and the system displays available vaccination types and recommended dates based on the patient's age, medical history, and vaccination schedule.

	5. The patient selects a vaccination type and a preferred date, and the system schedules the vaccination appointment. 6. The system sets up a reminder for the upcoming vaccination and stores the scheduled appointment in the patient's profile. 7. The system sends a reminder to the patient (like via email or SMS) a set number of days before the scheduled vaccination date. 8. After the vaccination is administered (handled by a separate use case involving medical staff), the system updates the patient's vaccination history with the new record.
Description of Alternative Sequence	1. Step 2: If the system fails to retrieve the patient's profile, an error is displayed, and the patient is prompted to contact the IT administrator. 2. Step 5: If the system fails to schedule the vaccination, an error is logged, and the IT administrator is notified. 3. Step 7: If the system fails to send the vaccination reminder, an error is logged, and the IT administrator is notified.
Non Functional Requirements	● NF-REQ-08: Vaccination history must be retrieved in under 2 seconds for quick access by patients. ● NF-REQ-20: Secure role-based access must be enforced to ensure patients can only view and manage their own vaccination records. ● NF-REQ-33: Automated alerts via email and SMS must be sent to IT personnel in case of failures (like missed reminders). ● NF-REQ-34: Multi-language support must be provided to ensure usability for diverse patients.
Postconditions	● The patient can view their up-to-date vaccination history.

	• A new vaccination appointment is successfully scheduled and stored in the system. • The patient receives a reminder for the upcoming vaccination. • The system ensures that all actions (viewing history, scheduling, and sending reminders) are logged for audit purposes. • The system is ready for the next vaccination management task.

Author: Eglis Braho

UC Name	UC-25 Resource Allocation
Summary	The system facilitates efficient allocation and tracking of hospital resources, including medical staff, equipment, and supplies, with real-time visibility into their availability, location, and status. It enables managers to assign resources to departments or cases as needed, tracks inventory levels, and ensures timely restocking to maintain smooth operations.
Dependency	-
Actors	• Primary Actor: Inventory Manager
Preconditions	• All hospital resources (beds, equipment, staff) must be registered and tracked within the system. • The system is integrated with real-time resource tracking (for beds, equipment, etc.).
Description of the Main Sequence	1. The Inventory Manager navigates to the Resource Allocation Module. 2. The system displays a real-time overview of available hospital resources, including medical devices, beds, and wheelchairs. 3. The Inventory Manager selects a resource (like medical device) to allocate to a specific department or patient. 4. The system checks resource availability and confirms the allocation. 5. The Inventory Manager assigns the resource to the relevant department or case (like ICU, surgery, emergency). 6. The system updates the resource status to reflect its allocation. 7. The system tracks inventory levels of supplies (like surgical gloves, medications) and provides alerts when restocking is required. 8. The Inventory Manager can reallocate or deallocate resources as needed, with the system automatically adjusting the inventory and status accordingly.
Description of the Alternative	**Step 4-**If the requested resource is unavailable, the system

Sequence	will notify the Inventory Manager and suggest alternative resources. **Step 7-**If supplies (like medications or disposables) are low, the system alerts the Inventory Manager, who can reorder stock to avoid disruptions. **Step 2-**In case of downtime, the Inventory Manager will be notified, and resource allocations will be temporarily suspended until the system is restored.
Non functional requirements	• NF-REQ-06 (Performance): The system must provide real-time updates on resource availability and status with minimal delays, ensuring smooth operations during resource allocation. • NF-REQ-11 (Availability): The system shall maintain 99.9% uptime, ensuring hospital resources are always accessible for allocation, especially during critical periods. • NF-REQ-19 (Security): The system must require role-based authentication to ensure that only authorized personnel (Inventory Manager, Department Heads) can manage resource allocations. • NF-REQ-10 (Performance): The system should provide quick response times for resource status queries and allocation requests, aiming for 95% of interactions to be completed in less than 1 second. • NF-REQ-17 (Data Backup Requirement): The system shall automatically back up resource allocation data every 15 minutes to prevent data loss. • NF-REQ-20 (Security): The system shall log all allocation and deallocation actions to maintain an audit trail for security and accountability.
Postconditions	• The system updates the resource inventory to reflect current allocations. • The system logs all resource allocation actions for audit and tracking purposes. • The system tracks inventory levels and alerts the Inventory Manager when restocking is required.

Author: Arjan Muka+ Nikola Rigo

UC Name	UC-26 Inventory Item & Procurement Management
Summary	The hospital system enables inventory managers to manage inventory items, submit purchase requests, and track deliveries, while procurement officers verify invoices and send offers to the board for approval. The board (managers and admins) reviews offers, approves the best choice, and approves, modifies, or rejects offers. The system ensures efficient inventory management, timely procurement, and accurate tracking of supplies.
Dependency	
Actors	• **Primary Actors:** Inventory Manager, Procurement Officer, Board (Manager) • **Indirect Actor:** Supplier
Preconditions	• The system must have an up-to-date inventory of items, including current stock levels. • The inventory manager, procurement officer, and board members must have appropriate permissions to access the inventory management system. • The system must have a list of approved suppliers and their contact details. • The system must be operational and accessible to all actors.
Description of Main Sequence	1. The inventory manager logs into the hospital system and selects the "Inventory Management" module. 2. The inventory manager manages inventory items by checking current stock levels and identifying items that need restocking. 3. The inventory manager submits a purchase request for the required items, specifying quantities and preferred suppliers.

	4. The system notifies the procurement officer of the new purchase request (via an internal notification). 5. The procurement officer logs into the system, reviews the purchase request, and views the list of available suppliers. 6. The procurement officer sends offers to the board for approval, including details of the items, quantities, and supplier quotes. 7. The board (manager or admin) logs into the system, reviews the offers, and approves the best choice based on cost, quality, and delivery timelines. 8. If the board approves the offer, the procurement officer verifies the invoices from the supplier and confirms the order. 9. The inventory manager tracks the delivery of the items in the system, updating the inventory once the items are received. 10. The system logs all actions (purchase request, offer approval, invoice verification, and delivery tracking) for audit purposes.
Description of Alternative Sequence	**Step 4:** If the system fails to notify the procurement officer of the purchase request, an error is logged, and the IT administrator is notified. **Step 6:** If the system fails to send offers to the board, an error is logged, and the IT administrator is notified. **Step 10:** If the system fails to log actions (like offer approval), an error is logged, and the IT administrator is notified.
Non Functional Requirements	● NF-REQ-08: Inventory records must be retrieved in under 2 seconds for efficient management. ● NF-REQ-20: Secure role-based access must be enforced to ensure only inventory managers, procurement officers, and board members can perform their respective tasks. ● NF-REQ-18: The system must log all errors (like failed notifications) and notify administrators for immediate resolution. ● NF-REQ-26: Customizable workflows must be supported to adapt to different hospital procurement policies.

Postconditions	● The inventory manager successfully submits a purchase request for required items. ● The procurement officer sends offers to the board, and the board approves the best choice. ● The procurement officer verifies invoices, and the order is placed with the supplier. ● The inventory manager tracks the delivery and updates the inventory upon receipt of items. ● The system ensures that inventory levels are accurately updated and reflected in real time. ● All actions (purchase request, offer approval, invoice verification, and delivery tracking) are logged for audit purposes. ● The system is ready for the next inventory management task.

Author: Marin Tartaraj

UC Name	UC-27 Supplier Management
Summary	This use case allows the Inventory Manager to manage a list of suppliers by adding, updating, or removing supplier details, while preserving historical data for transparency. Modifications are logged for accountability.
Dependency	
Actors	Procurement Officer
Preconditions	1. The Procurement Officer must be logged into the system. 2. The system must be online and accessible. 3. The manager must have sufficient permissions to manage supplier data.
Description of Main Sequence	1. The Procurement Officer selects "Supplier Management" from the menu. 2. The system displays the list of suppliers. 3. The manager can choose to add, update, or remove supplier details such as name, contact information, and company details. 4. If adding, the system prompts the manager to enter the new supplier's details. 5. If updating, the system displays the current supplier information for modification. 6. If removing, the system asks for confirmation before deleting the supplier record. 7. The system validates the input to ensure correctness and completeness. 8. The system logs the action (add, update, or remove) along with the user and timestamp for accountability. 9. The system updates the supplier list and preserves historical data for each inventory item.
Description of Alternative Sequence	**3a**. If the manager attempts to update or remove a non-existent supplier, the system displays an error message. **4a.** If the manager enters missing or incorrect data, the

	system displays an error message and prompts for corrections. **6a.** If the manager cancels the removal confirmation, the system aborts the deletion process.
Non Functional Requirements	• **NF-REQ-01 (Usability Requirement):** A user-friendly interface helps Inventory Managers manage suppliers effectively. • **NF-REQ-02 (Usability Requirement):** Documentation and tutorials should support supplier management tasks. • **NF-REQ-06 (Performance Requirement):** The system must process supplier transactions efficiently, supporting 1000+ concurrent users. • **NF-REQ-07 (Performance Requirement):** Supplier transactions should be processed at a rate of at least 500 per second. • **NF-REQ-09 (Performance Requirement):** Quick database queries (200ms response time) for supplier information retrieval. • **NF-REQ-10 (Performance Requirement):** 95% of interactions (adding/updating suppliers) should complete within 1 second. • **NF-REQ-15 (Data Backup Requirement):** Supplier data should be backed up every 15 minutes to prevent data loss. • **NF-REQ-16 (Data Backup Requirement):** Backups should be stored in multiple locations for disaster recovery. • **NF-REQ-18 (System Error Handling Requirement):** The system should log errors and notify administrators if supplier management fails.

	• · **NF-REQ-27 (System Downtime Management Requirement):** Real-time notifications should inform users if supplier management features are affected.
Postconditions	1. If successful, the system updates the supplier list and preserves historical records for each inventory item. 2. If unsuccessful, the system displays an error message and prompts the manager to correct the issue.

Author: Eglis Braho

UC Name	UC-28 Ambulance Management
Summary	The system enables receptionists to track ambulance availability and location in real-time, displaying their status as available, on the road, or occupied. Using GPS, it dynamically updates locations to improve emergency response and patient transport coordination.
Dependency	None
Actors	• Primary Actor: Receptionist • Indirect Actors: System Administrator, Ambulance Driver
Preconditions	• The system must be connected to the GPS tracking module. • Ambulance status and location updates must be active and synchronized. • The receptionist must have login credentials to access ambulance tracking.
Description of the Main Sequence	1. The receptionist navigates to the Ambulance Management module. 2. The system displays the real-time status of ambulances (Available, On Route, Occupied). 3. For occupied ambulances, the system fetches and displays GPS location. 4. If an ambulance arrives at the hospital, its status updates automatically to "Available." *5.* The receptionist monitors and updates dispatch details as needed.
Description of the Alternative Sequence	**Step 4-** if the GPS tracking fails, the system notifies the administrator and defaults to last known location. **Step 3-** if the System goes down, the receptionist manually records ambulance status and updates once the system is restored. **Step1-**if the system catches an unauthorized access, the system prevents users from accessing ambulance data.
Non functional requirements	**1. Performance** • NF-REQ-08: The system shall retrieve ambulance location data in less than 2 seconds, ensuring quick access to real-time information.

	• NF-REQ-09: The system shall maintain an average response time of 200 milliseconds for all database queries related to ambulance status and location, ensuring near-instantaneous access to tracking data. **2. Security** • NF-REQ-19: The system shall require multi-factor authentication for staff to access ambulance tracking data, ensuring that only authorized personnel can interact with sensitive information. • NF-REQ-20: The system shall implement role-based access control (RBAC) to limit access to ambulance tracking and status updates based on user roles, ensuring that only receptionists and authorized users can modify ambulance details. **3. Availability** • NF-REQ-12: The system shall ensure 99.9% uptime, guaranteeing continuous availability of the ambulance tracking system, especially during critical emergency situations. • NF-REQ-14: The system shall limit unscheduled downtime to no more than 1 hour per year, ensuring that ambulance tracking is always available for dispatch coordination. **4. Usability** • NF-REQ-05: The system shall provide an intuitive user interface that allows receptionists to easily navigate and track ambulance status with minimal training. • NF-REQ-06: The system shall include real-time visual indicators (such as color codes or icons) to clearly show the status of each ambulance (Available, On Route, Occupied). • NF-REQ-07: The system shall provide easy-to-read notifications for any failures, such as GPS tracking issues or system downtimes, ensuring the receptionist can quickly address issues.
Postconditions	• The system updates the status of ambulances based on their movements. • The receptionist has accurate, real-time data on ambulance availability and location. • Any issues (GPS failures, system downtime) are logged for review.

Author: Arjan Muka

UC Name	UC-29 Permission Granting
Summary	The hospital system enables admins to assign permissions to users, ensuring that hospital staff (like nurses, doctors, inventory managers, etc.) have appropriate access to system features based on their roles. The system ensures secure and controlled access to sensitive data and functionalities.
Dependency	
Actors	**Primary Actor:** Admin
Preconditions	• The admin must have appropriate permissions to access the permission granting module. • The system must have a list of existing user accounts and predefined roles (like nurse, doctor, inventory manager, etc.). • The system must be operational and accessible to the admin.

Description of Main Sequence	1. The admin logs into the hospital system using their credentials. 2. The admin selects the "Permission Granting" module from the system dashboard. 3. The system displays a list of users and their current roles and permissions. 4. The admin selects a user (like a nurse) to assign or update permissions. 5. The admin assigns permissions to the user by selecting a role (like "Nurse") or specific permissions (like access to bed management, ability to order lab tests). 6. The system updates the user's profile with the new permissions and logs the change for audit purposes. 7. The system notifies the user (like via email or system notification) of the updated permissions. 8. The admin verifies that the permissions have been correctly applied by checking the user's updated profile.
Description of Alternative Sequence	1. Step 3: If the system fails to retrieve the user's profile, an error is displayed, and the admin is prompted to contact the IT administrator. 2. Step 6: If the system fails to update the user's permissions, an error is logged, and the IT administrator is notified. 3. Step 7: If the system fails to notify the user of updated permissions, an error is logged, and the IT administrator is notified. 4. If the system experiences downtime during the process, the admin can record the permission changes offline, and the data is synced once the system is back online (NF-REQ-28). 5. If the admin accidentally assigns incorrect permissions, they can immediately revoke or modify the permissions by repeating steps 4–6.

Non Functional Requirements	• NF-REQ-08: User records must be retrieved in under 2 seconds for efficient permission assignment. • NF-REQ-20: Secure role-based access must be enforced to ensure only admins can assign permissions. • NF-REQ-19: Multi-factor authentication must be required for admins to access the permission granting module. • NF-REQ-18: The system must log all errors (like failed permission updates) and notify administrators for immediate resolution.
Postconditions	• The user's permissions are successfully updated in the system. • The user is notified of the updated permissions. • The system ensures that the user can now access the appropriate features based on their new permissions. • All actions (permission assignment, updates, and notifications) are logged for audit purposes. • The system is ready for the next permission granting task.

Author: Shpetim Shabanaj

UC Name	UC-30 Visitor Management
Summary	This use case allows receptionists to register visitors for hospitalized patients and record visit details in the patient's portfolio.
Dependency	-
Actors	**Primary Actor:** Receptionist
Preconditions	The required patient must be hospitalized and have an active medical portfolio.
Description of Main Sequence	1. The receptionist shall navigate to "Visitor Management" feature. 2. The receptionist searches for the hospitalized patient by name or ID. 3. The system displays the patient's details and current visitor logs. 4. The receptionist enters visitor information, including: - Visitor's full name - Contact information - Relationship to the patient - Check-in time 5. The system verifies the visitor's details and checks for any restrictions on visiting hours or visitor limits. 6. If all conditions are met, the system registers the visitor and updates the patient's portfolio with visit details. 7. Upon visitor departure, the receptionist records the check-out time in the system. 8. The system then displays the visit details and duration.
Description of Alternative Sequence	• **Step 3:** If the patient has exceeded the allowed number of visitors, the system notifies the receptionist and prevents further registrations. • **Step 6:** If there are any missing fields, there is displayed an error and the receptionist is redirected to form's page.
Non Functional Requirements	• **NF-REQ-36:** The system should provide a real-time visitor log for security and auditing purposes. • **NF-REQ-20:** Secure role-based access should restrict visitor data modification to authorized personnel. • **NF-REQ-08:** The visitor registration process should be completed in under 2 seconds to avoid reception delays.
Postconditions	• The visitor is successfully registered in the system.

	• The patient's portfolio is updated with visit details. The system maintains a log of visitor check-ins and check-outs for security and tracking.

Author:

UC Name	UC-31 Employee Management System(HR management)
Summary	This use case allows the HR Manager to add, update, view, and manage employee records, including personal information, job details, compensation, attendance, and skills. It helps keep staff data organized and up to date for HR operations.
Dependency	
Actors	**Primary actor:** HR Manager
Preconditions	• The HR Manager is logged in with the correct role and access. • The system is connected to the employee database. • The employee management module is accessible from the HR dashboard.
Description of Main Sequence	1. HR Manager opens the "Employee Management" module. 2. The system shows a searchable list of all employees. 3. HR Manager selects one of the following actions: -Add Employee – enters name, ID, job title, salary, contact, skills, etc. -Update Employee – modifies existing records such as role, salary, or attendance. -Archive Employee – marks an employee as inactive (like resigned/retired). 4. The system validates input and saves the changes. 5. A success message is displayed, and the database is updated.
Description of Alternative Sequence	• **Step 3:** If required fields are missing or contain invalid data, the system highlights the errors and prevents submission. • **Step 4:** If the HR Manager tries to add an employee with an existing ID, the system shows a duplicate warning.
Non Functional Requirements	• **Security: NF-REQ-21:** Only HR Managers should have access to add, update, or archive employee data. • **Performance: NF-REQ-08:** Employee records must be retrieved and updated in under 2 seconds.

	• **System Error Handling: NF-REQ-18**: The system must log any failed update attempts or access errors.
Postconditions	• Employee records are created, updated, or archived successfully. • All actions are saved in the hospital database. • Audit logs are updated with timestamps and user info. • HR Manager sees updated employee data in real time.

Author: Nikola Rigo

UC Name	**UC-32 Financial Management**
Summary	Enables the Financial Manager to set and monitor departmental budgets, track expenditures, and maintain detailed financial logs for audit purposes. The system allows input of budget details (like total amounts, expense categories, department names), tracks real-time expenses (including HR expenses, inventory costs, etc.), calculates the implied surplus or shortage of funds, and logs all financial transactions for auditing.
Dependency	-
Actors	**Primary Actor:** Financial Manager
Preconditions	- The Financial Manager must be authenticated and have the necessary permissions. - The hospital's financial and expense data from various departments (HR, inventory, etc.) are available in the system. - The financial management module is fully operational and integrated with other relevant systems.
Description of Main Sequence	1. **Budget Setup & Monitoring:** a. The Financial Manager logs into the system and navigates to the budget management section. b. The manager inputs budget details, such as total amounts, expense categories, and department names (either annually or by department). c. The system validates inputs and stores the budget details. 2. **Expense Tracking & Calculation:** a. The system tracks expenses in real time from various hospital departments (like HR expenses, inventory costs). b. It calculates the overall expenditures and determines the implied surplus or shortage of funds. 3. **Financial Logging & Audit:** a. All financial transactions (purchases, payments, budget updates) are logged automatically by the system.

	b. The Financial Manager can input or verify transaction details (type, amount, date, and relevant identifiers). c. The system validates and securely stores these logs for audit purposes.
Description of Alternative Sequence	- **Data Entry Error:** If the Financial Manager inputs incomplete or invalid budget or transaction details, the system prompts for corrections before saving. - **Integration Disruption:** If data from any department is temporarily unavailable, the system logs the missing data and notifies the manager for follow-up. - **Audit Discrepancy:** If discrepancies are found during audit logging, the system flags the issue for further investigation by the Financial Manager.
Non Functional Requirements	- **NF REQ-01**: Intuitive interface for financial managers to set budgets and track expenditures. - **NF REQ-02**: User documentation and tutorials to assist financial staff. - **NF REQ-06**: Notifications for budget overruns, high expenditures, or suspicious transactions. - **NF REQ-07**: The system must process at least 500 transactions per second. - **NF REQ-09**: Average response time for financial transactions should not exceed 200ms. - **NF REQ-10**: 95% of financial interactions should be completed within 1 second. - **NF REQ-12**: 99.9% uptime ensures continuous access to financial data. - **NF REQ-15**: Automatic backups every 15 minutes to prevent financial data loss. - **NF REQ-16**: Geographically distributed backups for disaster recovery. - **NF REQ-17**: Full data recovery within 30 minutes in case of corruption. - **NF REQ-18**: Logs all financial errors and notifies administrators. - **NF REQ-19**: Multi-factor authentication for financial staff. - **NF REQ-20**: Role-based access prevents unauthorized financial transactions. - **NF REQ-21**: Logs all failed login attempts for financial records access.

	- **NF REQ-30**: Maintains historical financial records for a minimum of 10 years. - **NF REQ-33**: Sends automated alerts for critical financial system failures.
Postconditions	- Department budgets are defined, stored, and actively monitored. - The system calculates and displays the surplus or shortage of funds based on real-time expense tracking. - All financial transactions are logged and stored, providing a comprehensive audit trail. - Financial reports and audit logs are updated and available for review by the Financial Manager.

HMS Use-case Diagram