The Mayo Clinic (HMS)

STAKEHOLDERS

ACTOR	REQUIREMENTS
Administrative staff	Administrative staff including registration staff, billing staff, and managerial personnel, will use the HMS for patient registration, billing, generating reports, and managing hospital operations. Their workflows and tasks will be influenced by the system's functionality and usability.
Doctors	These stakeholders will use the HMS for managing appointments, accessing patient information, ordering tests, prescribing treatments, and providing instructions for patient care.
Nurses	For accessing patient information and accessing instructions for patient care.
Senior Management	They are the primary stakeholders as they are overseeing the implementation of the HMS. They are responsible for ensuring that the system meets the needs of the clinic and its patients
Patient	Patients are the end-users of the system. They will interact with the system for appointment scheduling, registration, accessing medical records, and receiving reminders. Their experience with the system will directly impact their satisfaction with Mayo Clinic's services.
IT Department	The IT department of Mayo Clinic will be responsible for implementing, maintaining, and supporting the HMS. They will ensure that the system meets technical requirements, such as database management, system availability, response time, and error logging.
Regulatory Authorities	Regulatory authorities, such as healthcare regulatory agencies and government bodies, may have requirements and standards that the HMS needs to comply with. Ensuring regulatory compliance is essential for avoiding legal issues and maintaining the clinic's reputation.
Insurance Companies	They will interact with the system for processing claims and accessing patient insurance details.
Third-party Vendors	If the HMS involves third-party vendors for software development, implementation, or support services, they are also stakeholders. Mayo Clinic relies on these vendors to deliver a functional and reliable system according to the specified requirements and timelines.

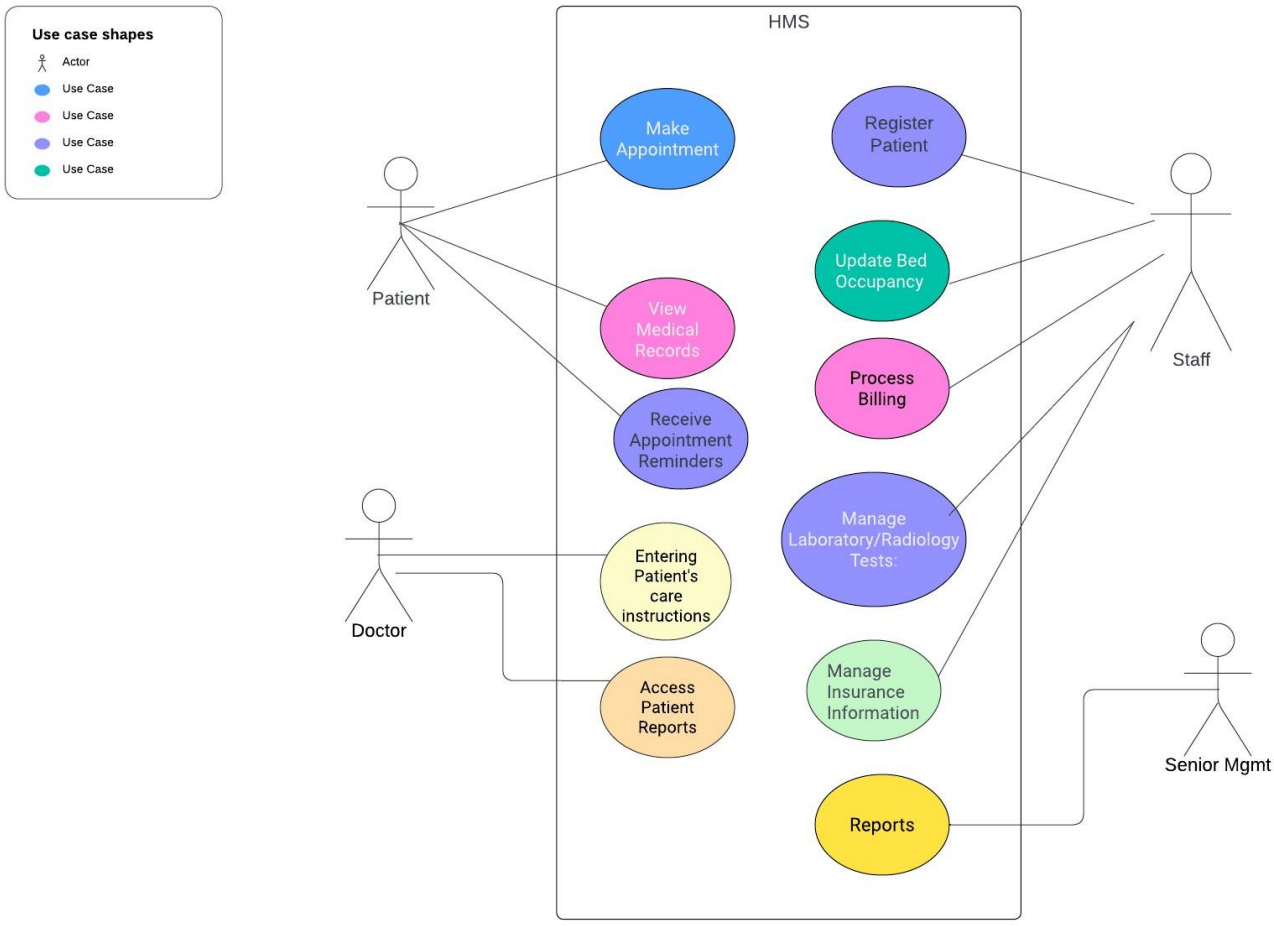
SCOPE

The scope of the Hospital Management System (HMS) project for Mayo Clinic encompasses the following:

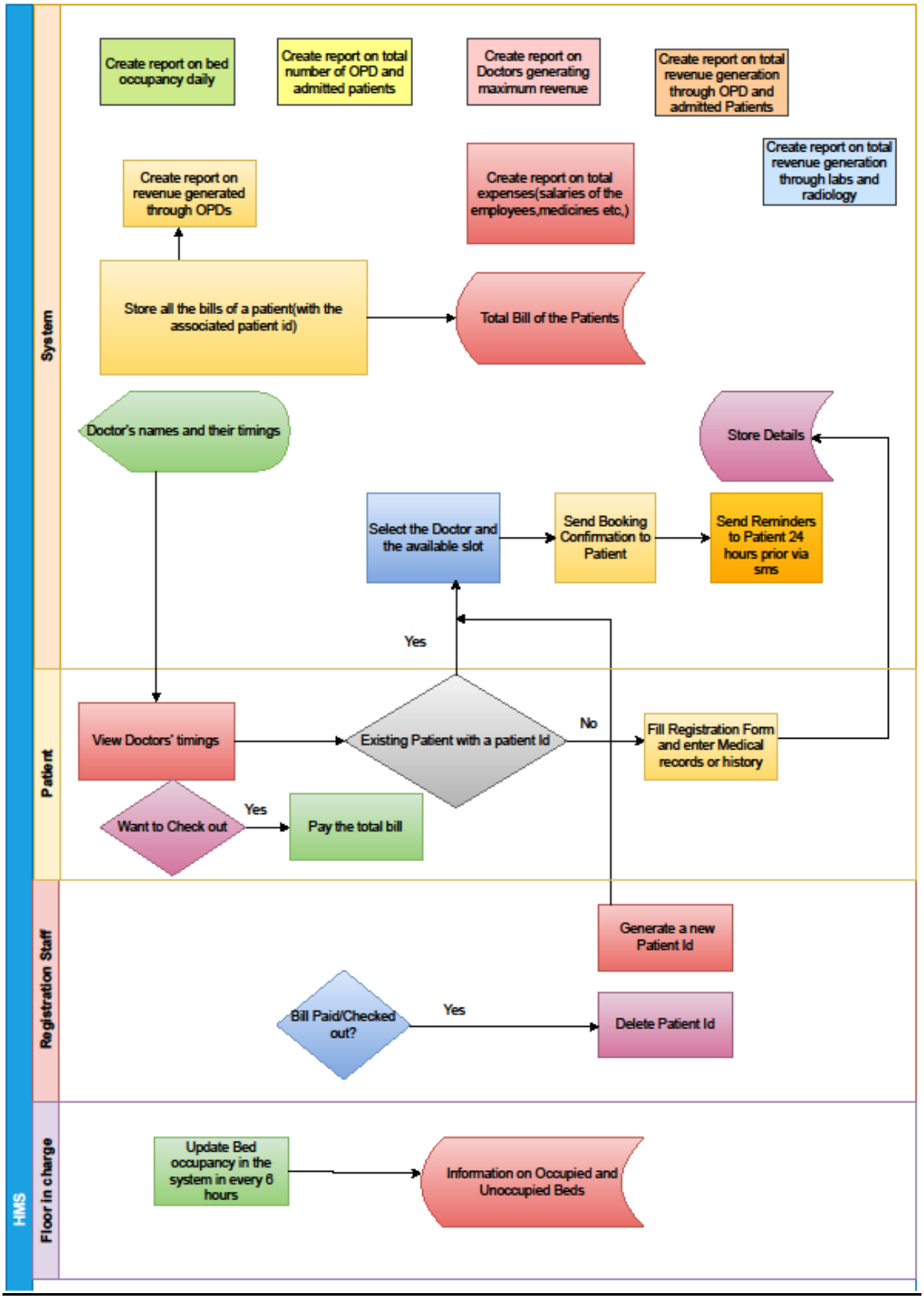
Appointment Management	Implementing a system to display doctors' timings on the website, allowing patients to select available appointment slots, and booking appointments with their chosen doctors.

Appointment Reminders	Developing functionality to send email and SMS reminders to patients one day prior to their scheduled appointments.
Patient Registration	Creating a system for registering new patients upon their arrival at the hospital, storing their medical records and history, and assigning unique patient IDs for identification purposes.
Bed Occupancy Tracking	Implementing a feature to track the occupancy status of all beds in the hospital, indicating which beds are occupied and which are vacant. This information is updated every 6 hours.
Billing Management	Developing functionality to calculate and total all expenses incurred by patients during consultations or hospital stays, generating complete bills for billing purposes.
Management of Laboratory, Blood Bank, and Radiation Departments	Integrating systems to manage requests for tests, receive test results, and store reports electronically, eliminating the need for paper-based reports.
Reporting	Generating reports for senior management to provide insights into hospital revenue, expenses, bed occupancy, and other relevant metrics.
Staff Management	Storing information about nurses and ward boys, including their names, schedules, and assigned wards.
Patient Care Instructions	Allowing doctors to enter instructions for patient care into the system, which can be accessed by nurses to provide appropriate treatment.
Insurance Management	Storing insurance details for patients with insurance coverage, facilitating claim processing.
Technical Requirements	Utilizing a MySQL database, running on Windows 2016 operating system, ensuring the system is web-based, responsive, capable of supporting 500 concurrent users, maintaining error logs, and providing high usability.

SCOPE using Use Case Diagram (UML)



WORKFLOW OF THE PROPOSED SYSTEM



IN SCOPE

1. Appointment Management:
    - Allowing patients to schedule appointments with doctors.
    - Displaying doctors' schedules on the website.

- Sending appointment reminders via email and SMS.

2. Patient Registration:
    - Registering new patients and assigning unique patient IDs.
    - Storing patients' personal and medical information.
    - Managing patient records and medical history.
3. Bed Occupancy Tracking:
    - Monitoring and updating bed occupancy status in real-time.
    - Showing the availability of beds in the hospital.
4. Billing Management:
    - Generating and managing bills for patients.
    - Consolidating expenses incurred by patients during consultations or hospital stays.
5. Management of Laboratory, Blood Bank, and Radiation Departments:
    - Managing requests for tests and procedures.
    - Storing and accessing test results electronically.
    - Eliminating the need for paper-based reports.
6. Reporting:
    - Generating reports for senior management to provide insights into hospital operations and finances.
    - Providing analytics on revenue, expenses, bed occupancy, etc.
7. Staff Management:
    - Managing schedules and responsibilities of nurses and ward boys.
    - Storing staff information and assignments.
8. Patient Care Instructions:
    - Allowing doctors to input instructions for patient care.
    - Enabling nurses to access and follow doctors' instructions through the system.
9. Insurance Management:
    - Storing and managing patients' insurance details for billing and claim processing.
10. Technical Requirements:
    - Utilizing MySQL database and Windows 2016 operating system.
    - Developing a web-based application with specific response time and capacity requirements.
    - Ensuring system availability and usability.

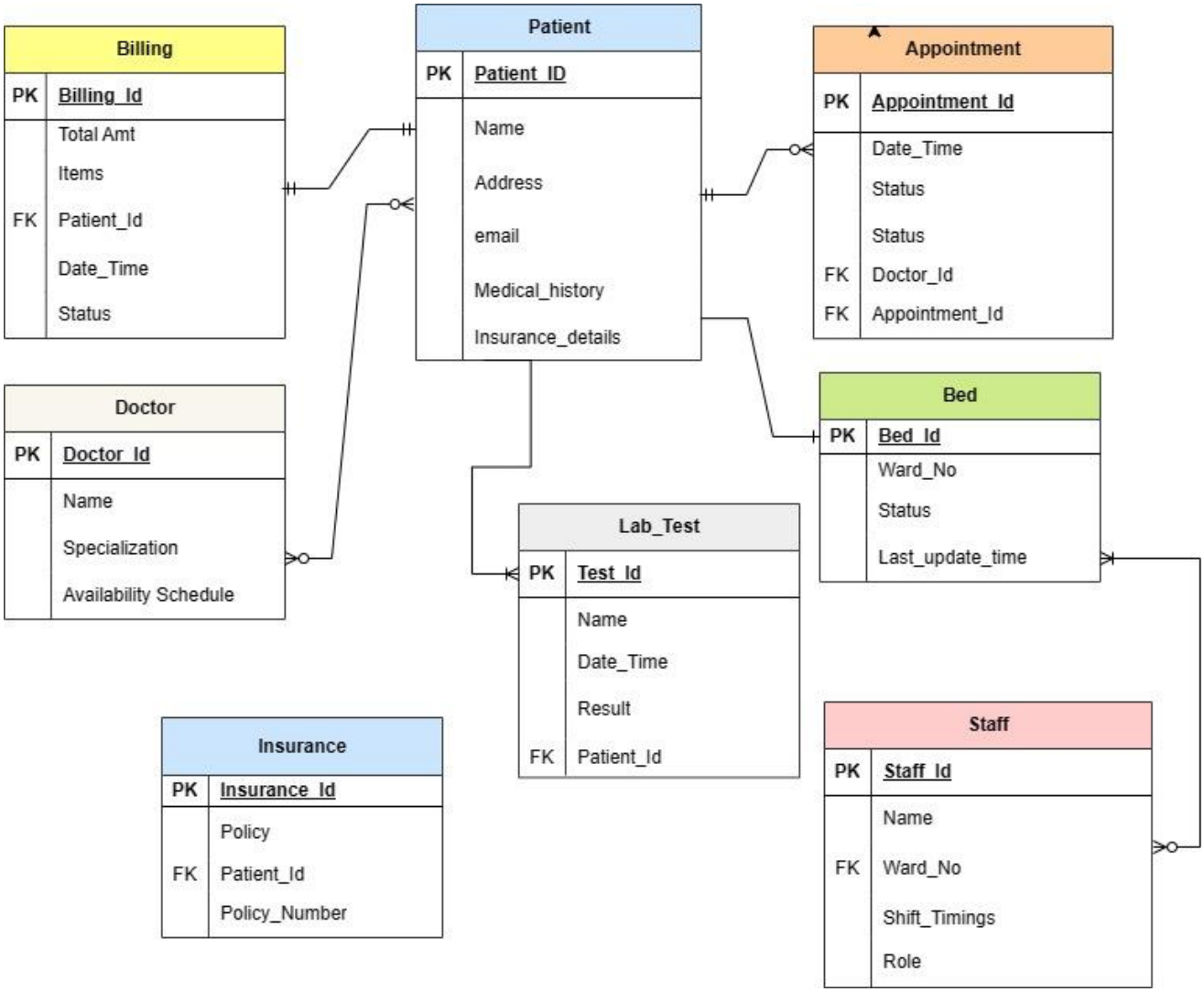
OUT OF SCOPE

1. Medical Diagnosis and Treatment:
    - The system does not involve providing medical diagnoses or treatment recommendations. It's focused on managing administrative and operational aspects of the hospital.
2. Patient Communication Beyond Reminders:
    - While the system sends appointment reminders, it does not handle other forms of patient communication, such as medical advice or consultations.
3. Pharmaceutical Management:
    - Managing pharmacy operations, including medication inventory and dispensing, is not within the scope of this system.
4. Patient Transportation and Accommodation:
    - Handling patient transportation to and from the hospital, as well as accommodation arrangements, are not part of the system's scope.
5. Medical Equipment Management:

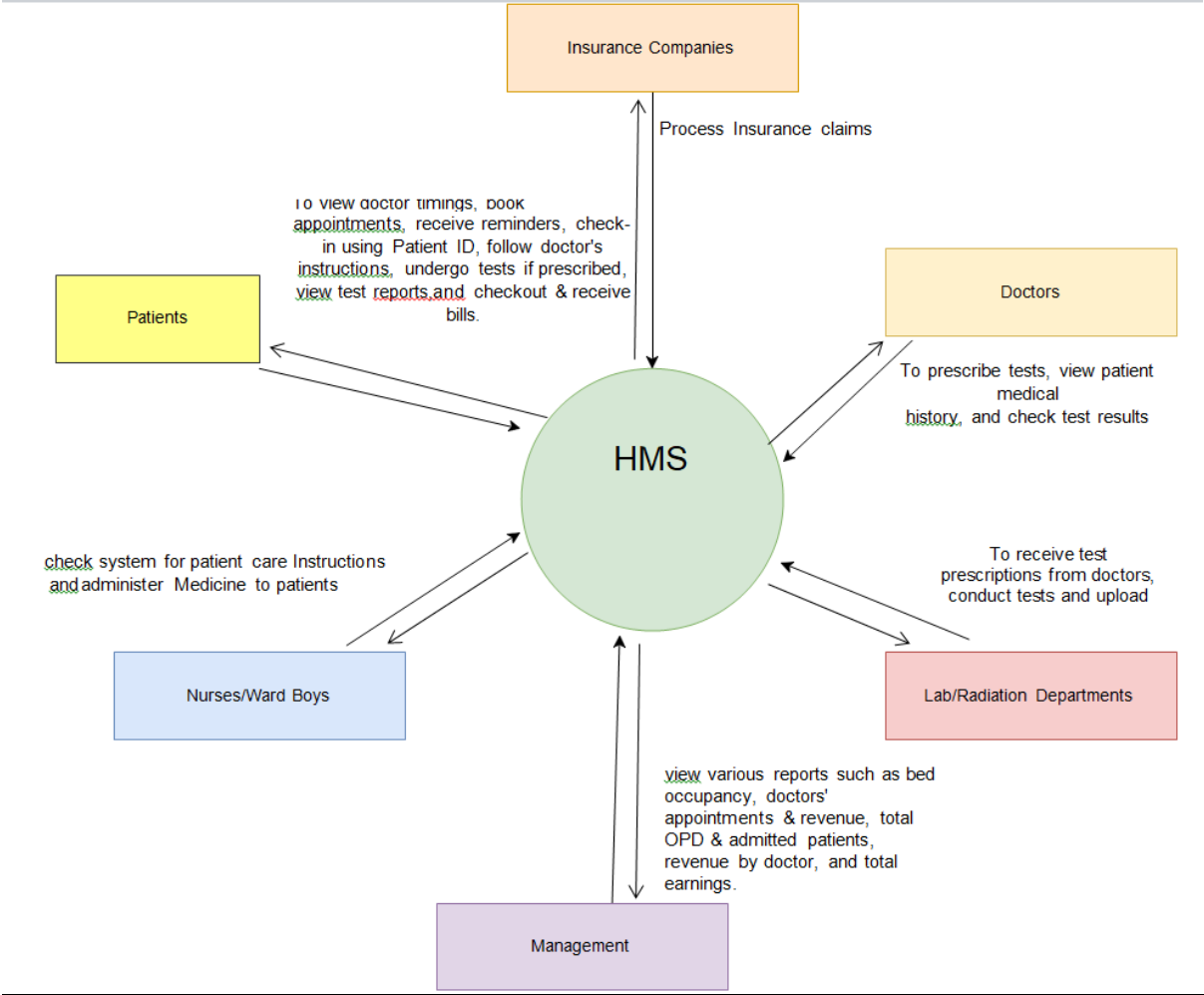
- Tracking and managing medical equipment inventory and maintenance are not included in the system.

6. Legal and Regulatory Compliance:
    - While the system may generate reports for compliance purposes, ensuring full legal and regulatory compliance with healthcare standards is not explicitly part of the system's scope.
7. Integration with External Systems:
    - Integrations with external systems beyond basic requirements, such as interoperability with other healthcare providers' systems, are not within the initial scope of the project.

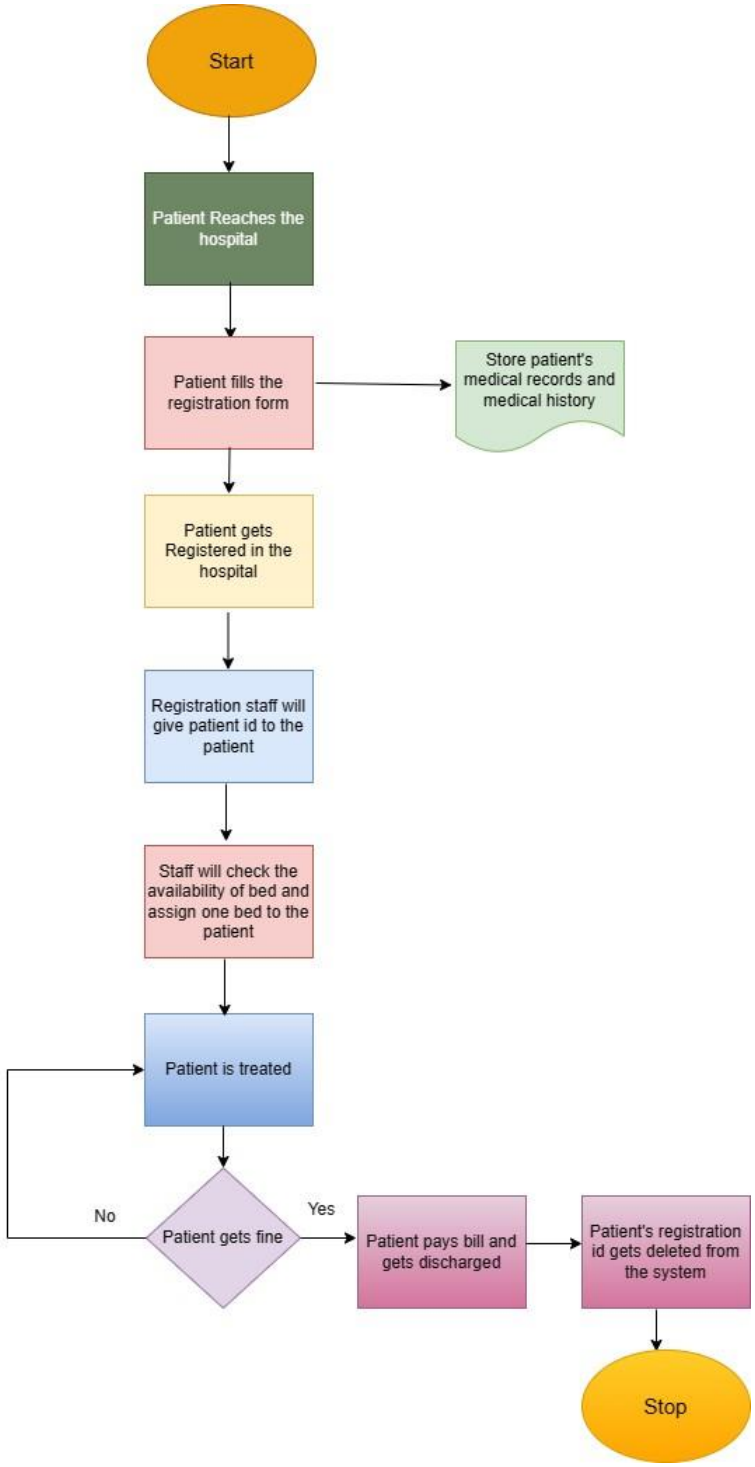
ER Diagram for HMS



Data Flow Diagram for HMS



Flow chart for patient admission



FUNCTIONAL REQUIREMENTS

1. Appointment Management:
    - Allow patients to view doctors' schedules.
    - Enable patients to schedule appointments with preferred doctors.
    - Provide a calendar view for available appointment slots.

- Allow patients to cancel or reschedule appointments.

2. Appointment Reminders:
    - System should send email and SMS reminders to patients one day prior to their scheduled appointments.
    - Reminders should include appointment details and instructions for preparation, if applicable.
3. Patient Registration:
    - Capture patient demographic information during registration.
    - Assign a unique patient ID to each registered patient.
    - Store patient information securely in the system.
    - Allow registration staff to update patient records as needed.
4. Bed Occupancy Tracking:
    - Display real-time status of occupied and vacant beds.
    - Update bed occupancy status regularly (e.g., every 6 hours).
    - Provide a list of available beds for new admissions.
5. Billing Management:
    - Calculate total expenses incurred by each patient.
    - Generate itemized bills for patients based on services rendered.
    - Include details of consultations, procedures, medications, and other expenses.
    - Ensure billing accuracy and transparency.
6. Management of Laboratory, Blood Bank, and Radiation Departments:
    - Allow doctors to request tests and procedures for patients.
    - Receive test requests electronically in respective departments.
    - Perform tests and procedures as requested.
    - Upload test results and reports to patient records.
7. Reporting:
    - Generate various reports for senior management and stakeholders.
    - Reports should include revenue, expenses, bed occupancy, patient demographics, and other relevant metrics.

- Provide options for customizing report parameters and filters.

8. Staff Management:
    - Maintain a database of staff members, including nurses and ward boys.
    - Store staff schedules and assignments.
    - Allow staff to update their availability and leave requests.
    - Ensure proper allocation of staff to different departments and shifts.
9. Patient Care Instructions:
    - Enable doctors to enter instructions for patient care.
    - Provide nurses with access to patient care instructions.
    - Ensure clarity and accuracy of instructions to facilitate proper patient care.
10. Insurance Management:
    - Capture and store insurance details for patients with insurance coverage.
    - Verify insurance information during billing and claim processing.
    - Facilitate submission of insurance claims to respective providers.

NON-FUNCTIONAL REQUIREMENTS

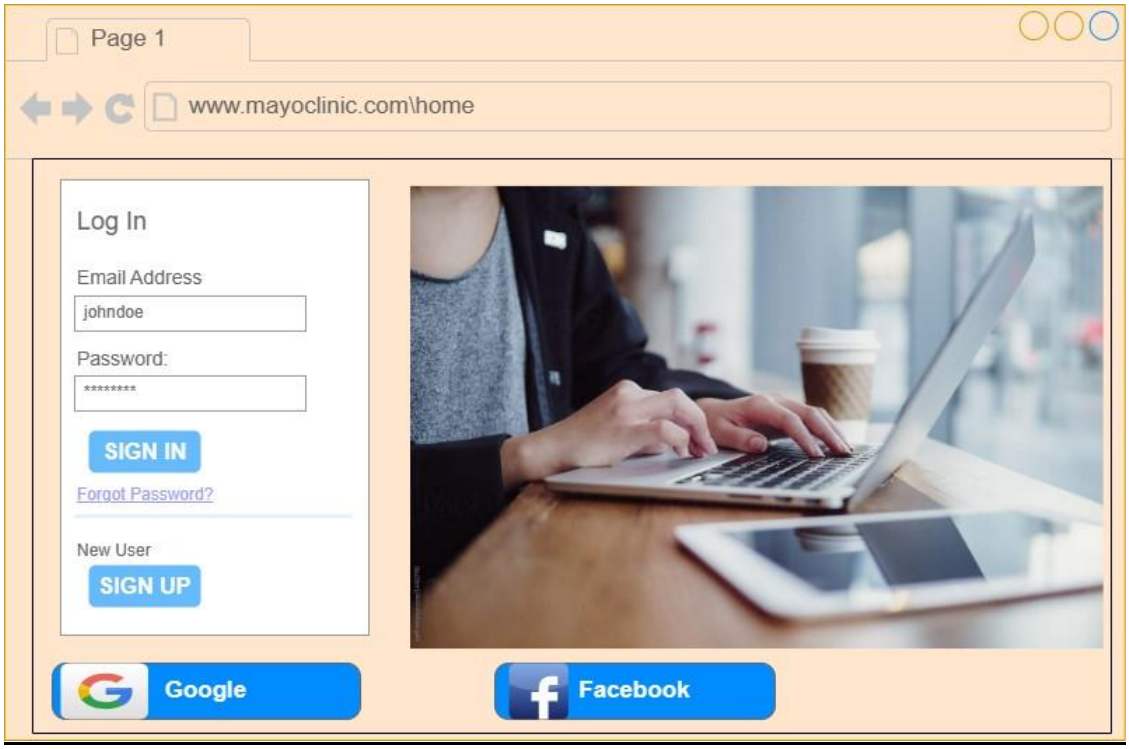
1. Performance:
    - The system shall respond to user interactions within 1 second.
    - The system shall support concurrent usage by up to 500 users without degradation in performance.
    - Database queries shall execute efficiently, minimizing response times.
2. Reliability:
    - The system shall be available 24/7, with a minimum uptime of 99.9%.
    - Error handling mechanisms shall be in place to ensure graceful recovery from failures.
    - Regular backups of the database shall be performed to prevent data loss.
3. Scalability:
    - The system architecture shall be scalable to accommodate future growth in the number of users and data volume.

- Additional hardware resources shall be easily deployable to handle increased workload demands.

4. Security:
    - Access to patient records and sensitive information shall be restricted based on user roles and permissions.
    - User authentication and authorization mechanisms shall be implemented to ensure data confidentiality and integrity.
    - Data transmission over the network shall be encrypted using secure protocols (e.g., HTTPS) to prevent unauthorized access.
5. Usability:
    - The user interface shall be intuitive and user-friendly, requiring minimal training for staff members.
    - Screens and data fields shall be self-explanatory, reducing the likelihood of user errors.
    - The system shall support accessibility features to accommodate users with disabilities.
6. Compatibility:
    - The system shall be compatible with commonly used web browsers (e.g., Chrome, Firefox, Safari).
    - The system shall support integration with third-party software and services, such as payment gateways and insurance platforms.
7. Maintainability:
    - The system shall be modular and well-documented to facilitate future updates and maintenance tasks.
    - Codebase shall adhere to coding standards and best practices to ensure readability and ease of modification.
    - Version control systems shall be used to manage changes to the software codebase.
8. Regulatory Compliance:
    - The system shall comply with relevant healthcare regulations and standards, such as HIPAA (Health Insurance Portability and Accountability Act).
    - Audit logs shall be maintained to track system activities and ensure compliance with regulatory requirements.

Wireframes:

1. Log In Screen



2. Dashboard for patient


Home
User Accounts
Chat
Appointments
Payment
Settings
Hi Nupur, Find a Doctor and make an appointment online
Hi,Nupur
Search a doctor
Summary
No of Patients
May
3500 Total Patients
500 Available staff
300 Available Doctors
Schedule
Cardiologist OPD 1 Wed 09:00 AM ....
Neurologist OPD 1 Tue 09:00 AM ....