## Key Features and Functional Requirements

1. **Patient Registration and Authentication**
   * **Sign Up/Sign In**: Patients must create an account using their personal information and authenticate themselves when accessing the system.
2. **Department and Clinic Selection**
   * **Select Department**: Patients can choose the relevant department (e.g., Cardiology, Orthopedics) based on their medical needs.
   * **Select Clinic**: Patients choose a specific clinic within the department.
3. **Doctor Selection**
   * **View Doctor Availability**: The system displays available doctors and their schedules.
   * **Choose Doctor**: Patients can select a doctor based on convenient appointment times or patient testimonials.
4. **Appointment Management**
   * **Appointment Booking**: Patients book appointments with their chosen doctor.
   * **Reception Check-In**: Upon arrival, the reception checks the patient's appointment and directs them accordingly.
5. **Medical Consultation**
   * **Doctor Consultation**: During the appointment, the doctor consults with the patient, diagnoses their condition, and updates the medical record.
   * **Update Medical Record**: The doctor writes the consultation notes and any diagnoses, which are added to the patient's medical record.
6. **Prescription Management**
   * **Prescription Writing**: The doctor writes a prescription for the patient, detailing the required medications.
   * **Send Prescription to Pharmacy**: The system automatically sends the prescription to the hospital's pharmacy.
7. **Pharmacy Management**
   * **Medication Selection**: The pharmacy staff receives the prescription and selects the required medications.
   * **Medication Dispensation**: The pharmacy prepares the medication for the patient, ready for collection.
8. **Billing and Payment**
   * **Invoice Generation**: The system generates an invoice for the services provided, including the consultation and medications.
   * **Payment Processing**: Patients pay for their services through integrated payment gateways.

## Key Entities and Relationships

### Entities:

1. **Patient**:
   * PatientID (Primary Key)
   * Name
   * ContactInfo
   * MedicalHistory
   * InsuranceInfo
2. **Doctor**:
   * DoctorID (Primary Key)
   * Name
   * Specialization
   * ContactInfo
3. **Nurse**:
   * NurseID (Primary Key)
   * Name
   * ContactInfo
4. **Pharmacist**:
   * PharmacistID (Primary Key)
   * Name
   * ContactInfo
5. **Clinic**:
   * ClinicID (Primary Key)
   * Name
   * Location
   * ContactInfo
6. **Receptionist**:
   * ReceptionistID (Primary Key)
   * Name
   * ContactInfo
7. **PatientAppointment**:
   * AppointmentID (Primary Key)
   * Date
   * Time
   * Status
   * PatientID (Foreign Key)
   * DoctorID (Foreign Key)
   * ClinicID (Foreign Key)
8. **MedicalRecord**:
   * RecordID (Primary Key)
   * Date
   * Diagnosis
   * Treatment
   * PatientID (Foreign Key)
   * DoctorID (Foreign Key)
   * AppointmentID (Foreign Key)
9. **Prescription**:
   * PrescriptionID (Primary Key)
   * Date
   * MedicationDetails
   * PatientID (Foreign Key)
   * MedicalRecordID (Foreign Key)
   * PharmacyID (Foreign Key)
10. **Pharmacy**:
    * PharmacyID (Primary Key)
    * Location
    * StockDetails
11. **Medication**:
    * MedicationID (Primary Key)
    * Name
    * StockLevel
    * ExpirationDate
    * PharmacyID (Foreign Key)
12. **Invoice**:
    * InvoiceID (Primary Key)
    * Date
    * Amount
    * Status
    * PatientID (Foreign Key)
13. **Payment**:
    * PaymentID (Primary Key)
    * Date
    * Amount
    * Method
    * InvoiceID (Foreign Key)
    * ClinicID (Foreign Key)
    * ReceptionistID (Foreign Key)
14. **availableAppointments** 
    * **AppointmentID** (Primary Key): A unique identifier for each appointment.
    * **ClinicID** (Foreign Key): References the clinic where the appointment is scheduled.
    * **DoctorID** (Foreign Key): References the doctor responsible for the appointment.
    * **Date**: The date and time of the appointment.
    * **MaxCapacity**: The maximum number of patients that can be booked for the appointment.

### Relationships:

* A **Patient** can have multiple **PatientAppointments**.
* A **Doctor** can manage multiple **PatientAppointments**.
* A **Clinic** can hold multiple **PatientAppointments**.
* A **Patient** can have multiple **MedicalRecords**.
* A **Doctor** can create multiple **MedicalRecords**.
* A **PatientAppointment** is associated with one **MedicalRecord**.
* A **Patient** can receive multiple **Prescriptions**.
* A **MedicalRecord** can generate multiple **Prescriptions**.
* A **Pharmacy** can fulfill multiple **Prescriptions**.
* A **Pharmacy** stores multiple **Medications**.
* An **Invoice** can contain multiple **Payments**.
* A **Patient** can be billed for multiple **Invoices**.
* A **Clinic** schedules multiple **DutyRosters**.
* **Doctors** to **Appointments**: One-to-Many (A doctor can have multiple appointments).
* **Clinics** to **Appointments**: One-to-Many (A clinic can have multiple appointments).

## Patient Process Flow

1. **Sign Up/Sign In**
   * The patient registers on the system or logs in if they already have an account.
2. **Select Clinic**
   * The patient selects the appropriate department (e.g., Cardiology) and clinic based on their healthcare needs.
3. **Choose Doctor**
   * The patient chooses a doctor based on available times or by reading testimonials from other patients.
4. **Reception Check-In**
   * Upon arrival at the clinic, the patient checks in at reception, where their appointment is verified.
5. **Medical Consultation**
   * The patient meets with the doctor, who updates the patient’s medical record with notes from the consultation.
6. **Prescription Writing**
   * If necessary, the doctor writes a prescription, which is added to the system.
7. **Send Prescription to Pharmacy**
   * The system sends the prescription to the hospital pharmacy for processing.
8. **Pharmacy Medication Selection**
   * The pharmacy receives the prescription, selects the necessary medication, and prepares it for the patient.
9. **Billing and Payment**
   * The system generates an invoice, which the patient pays, either online or at the clinic.