

# System Design Documentation: Small Medical Clinic Software System

## 1. System Architecture

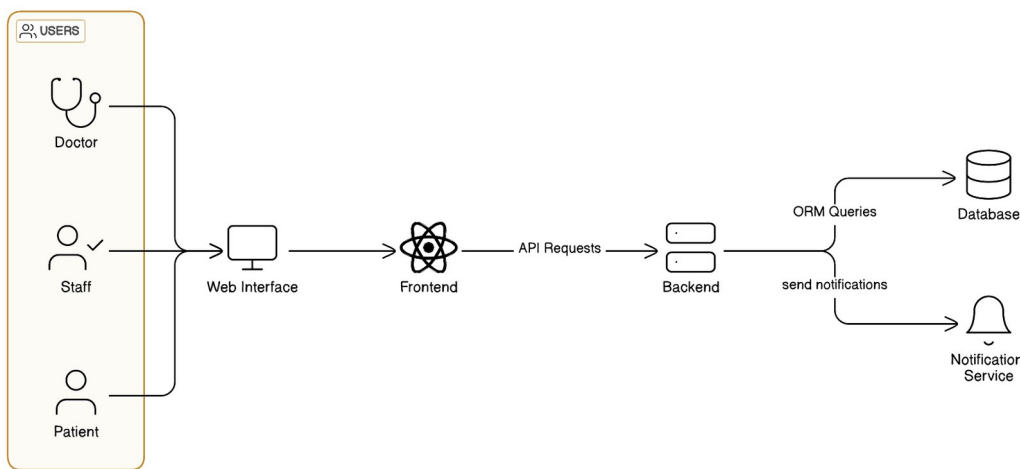
### 1.1 Overview

The system follows a three-tier architecture, designed for scalability, security, and usability:

- **Presentation Layer (Frontend):** Web-based UI using React.js (or similar framework) for staff, doctors, and patients.
- **Application Layer (Backend):** RESTful API built with Django or Node.js to handle business logic.
- **Data Layer (Database):** Centralized SQL database (e.g., PostgreSQL or MySQL) for structured data storage.

### 1.2 Architecture Diagram

Healthcare Web Application Architecture

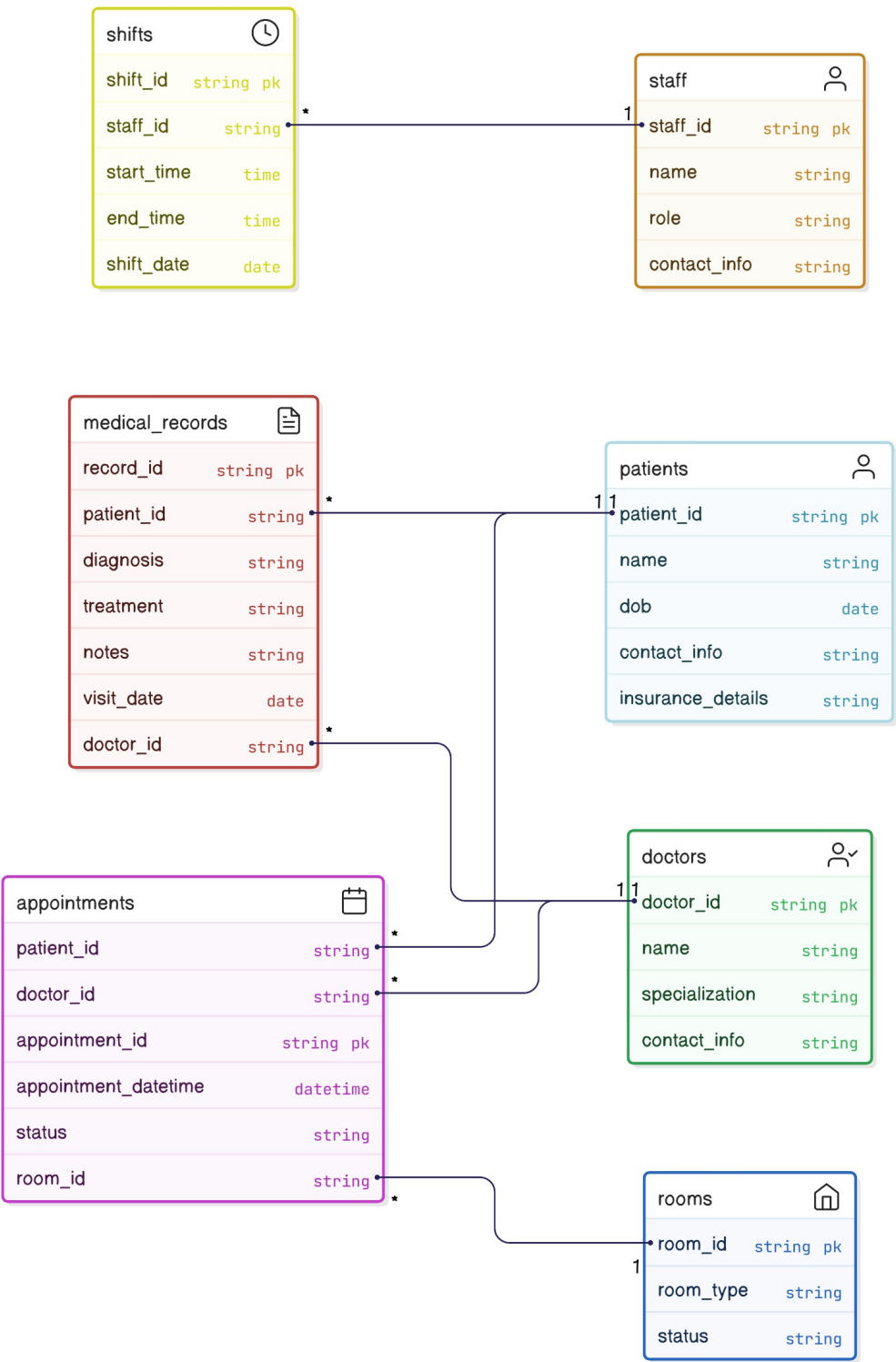


### 1.3 System Components

- **Authentication Module:** Role-based access (admin, doctor, nurse, receptionist, patient).
  - **Scheduling Module:** Manages shift and appointment calendars.
  - **EMR Module:** Handles secure storage and retrieval of medical records.
  - **Notification Service:** Sends automated SMS/email reminders.
  - **Analytics Module:** Generates reports on system usage, performance, and productivity.
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## 2. Entity-Relationship Diagram (ERD)

Healthcare Facility Data Model

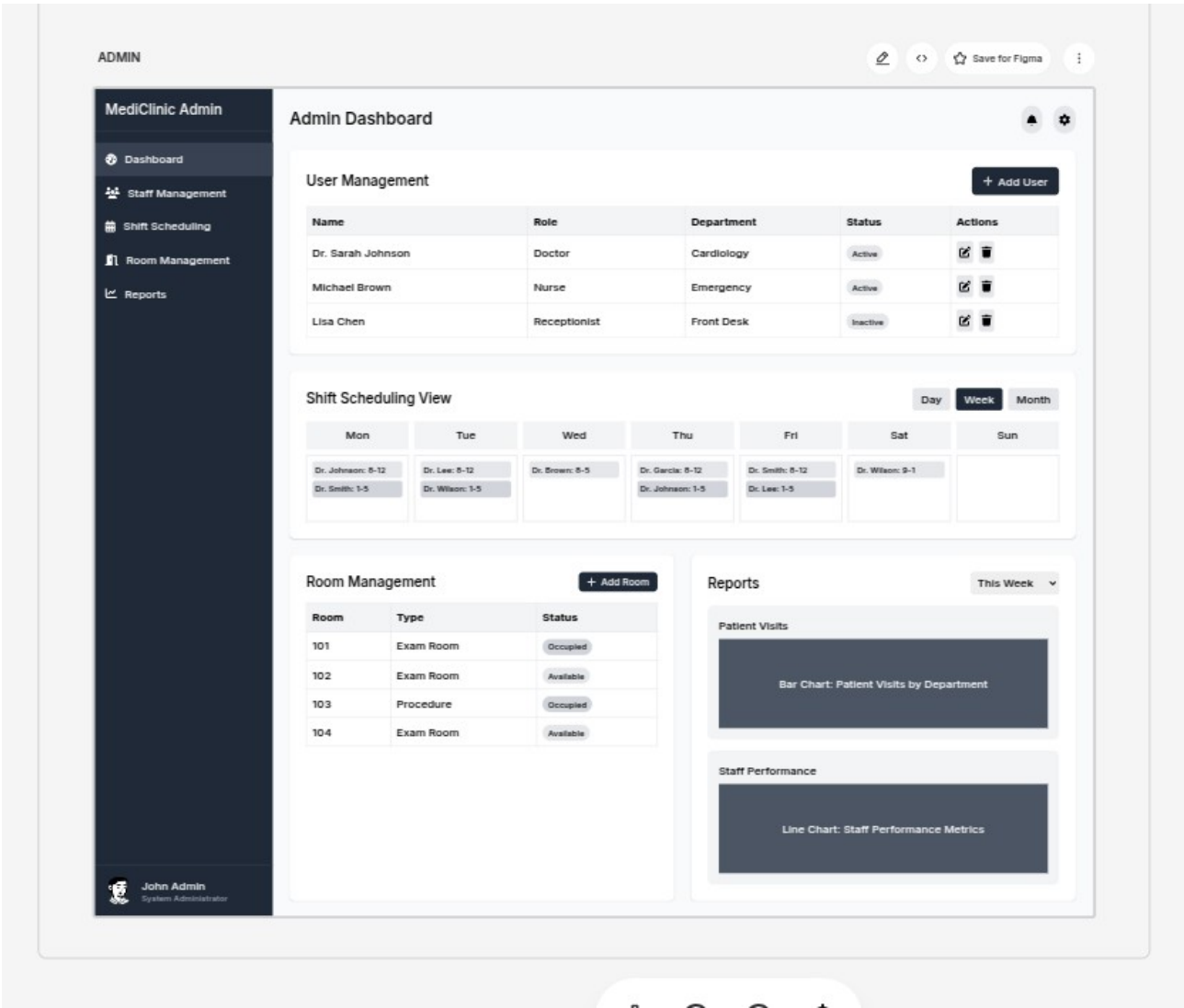


# 3. Interface Designs (UI Mockups)

## 3.1 Roles-Based Interface Design

### Admin Dashboard

- User Management
- Shift Scheduling Panel
- Examination Room Management
- Reporting & Analytics



### Doctor Interface

- View Schedule
- Access Patient Records
- Write Prescriptions

- Update EMR

MediClinic

Doctor Portal

Dashboard

Patients

Appointments

Prescriptions

Reports

Settings

Logout

Welcome, Dr. Smith

Thursday, May 1, 2025

Dr. Jane Smith

Cardiologist

Daily Schedule View

< Previous

Today


Next >


Time	Patient Name	Reason	Status	Action
8:00 AM	John Doe	Annual Checkup	Checked In	
8:30 AM	Sarah Johnson	Follow-up	In Progress	
11:00 AM	Mike Wilson	Prescription Refill	Scheduled	
1:30 PM	Emily Parker	Consultation	Scheduled	
3:00 PM	Robert Brown	Lab Results Review	Scheduled	


Patient Search

Search patients...


RECENT PATIENTS

 Sarah Johnson  
ID: #12345 • 42 yrs

 John Doe  
ID: #12346 • 58 yrs

 Emily Parker  
ID: #12347 • 35 yrs

EMR Access - Sarah Johnson

 Sarah Johnson  
DOB: 05/12/1983 Gender: Female  
Phone: (555) 123-4567 Patient ID: #12345

Medical History

Allergies: Penicillin, Peanuts

Chronic Conditions: Hypertension, Type 2 Diabetes

Previous Surgeries: Appendectomy (2015)

Recent Visits

04/01/2025

Follow-up for Hypertension

03/15/2025

Annual Physical Examination

02/22/2025

Medication Review


Full EMR

Lab Results

Prescriptions

Prescription Entry

Patient

 Sarah Johnson  
ID: #12345

Medication Name

Search medication...

Dosage

e.g. 10mg

Frequency

Once daily

Duration

e.g. 14

Days

Quantity

e.g. 30

Instructions for Patient

Special Instructions...

Notes (not visible to patient)

Doctor's notes...

Allow generic substitution


Print

Cancel

Receptionist Interface

- Register Patients
- Manage Appointments
- Notify Patients of Schedule Changes

MediClinic



Sarah Johnson

Receptionist

Registration

Appointments

Notifications12

Reports

Settings

Logout

Receptionist Dashboard

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Today: May 1, 2025

Patient Registration Form

Clear Form

Save Patient

First Name\*

Enter first name

Phone Number\*

(000) 000-0000

Last Name\*

Enter last name

Email Address

patient@example.com

Date of Birth\*

mm/dd/yyyy

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Insurance Provider\*

Enter insurance provider

Gender

Select gender

▼

Insurance ID\*

Enter Insurance ID

Appointment Booking Calendar

List View

New Appointment

< >

May 1 - 7, 2025

Today

Mon 1

Tue 2

Wed 3

Thu 4

Fri 5

Sat 6

Sun 7

9:00 AM

John Smith - Dr. Wilson

10:00 AM

Emily Davis - Dr. Johnson

11:00 AM

12:00 PM

Michael Brown - Dr. Wilson

9:00 AM

Sarah Johnson - Dr. Parker

11:00 AM

Robert Lee - Dr. Wilson

12:00 PM

1:00 PM

9:00 AM

Lisa Wong - Dr. Johnson

10:00 AM

11:00 AM

12:00 PM

David Miller - Dr. Parker

1:00 PM

9:00 AM

10:00 AM

Jennifer Garcia - Dr. Wilson

11:00 AM

Thomas Anderson - Dr. Johnson

12:00 PM

1:00 PM

9:00 AM

Maria Rodriguez - Dr. Parker

10:00 AM

11:00 AM

12:00 PM

James Wilson - Dr. Wilson

1:00 PM

Weekend - Clinic Closed

Weekend - Clinic Closed

Notification Log

Filter

Send New

Patient	Type	Date & Time	Status	Actions
John Smith	Appointment Reminder	May 2, 2025 - 9:00 AM	Sent	🔄 📧
Emily Davis	Appointment Reminder	May 2, 2025 - 10:00 AM	Sent	🔄 📧
Sarah Johnson	Appointment Reminder	May 3, 2025 - 10:00 AM	Sent	🔄 📧
Robert Lee	Appointment Reminder	May 3, 2025 - 11:00 AM	Sent	🔄 📧
Lisa Wong	Appointment Reminder		Scheduled	🔄 📧

Showing 5 of 24 notifications

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Previous

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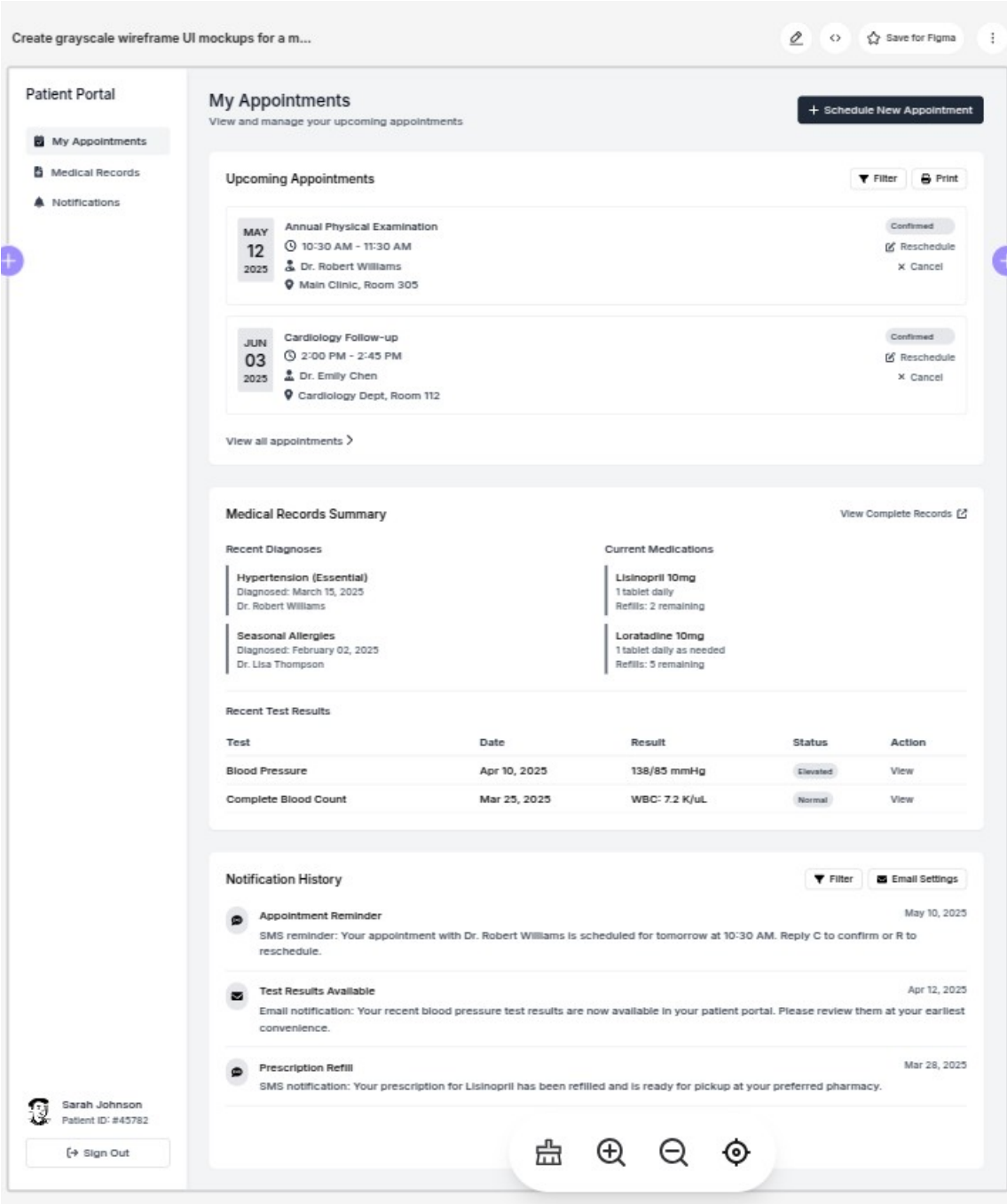
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Next

Patient Portal

- View Appointments
- Access Medical History
- Receive Notifications



## 4. Database Schema

```
CREATE TABLE Patient (  
    patient_id SERIAL PRIMARY KEY,  
    name VARCHAR(100),  
    dob DATE,  
    contact_info TEXT,  
    insurance_details TEXT  
);
```

```
CREATE TABLE Doctor (  
    doctor_id SERIAL PRIMARY KEY,  
    name VARCHAR(100),  
    specialization VARCHAR(100),  
    contact_info TEXT  
);
```

```
CREATE TABLE Staff (  
    staff_id SERIAL PRIMARY KEY,  
    name VARCHAR(100),  
    role VARCHAR(50),  
    contact_info TEXT  
);
```

```
CREATE TABLE Room (  
    room_id SERIAL PRIMARY KEY,  
    room_type VARCHAR(100),  
    status VARCHAR(50)  
);
```

```
CREATE TABLE Appointment (  
    appointment_id SERIAL PRIMARY KEY,  
    patient_id INT REFERENCES Patient(patient_id),  
    doctor_id INT REFERENCES Doctor(doctor_id),  
    room_id INT REFERENCES Room(room_id),  
    appointment_datetime TIMESTAMP,  
    status VARCHAR(50)  
);
```

```
CREATE TABLE MedicalRecord (  
    record_id SERIAL PRIMARY KEY,  
    patient_id INT REFERENCES Patient(patient_id),  
    doctor_id INT REFERENCES Doctor(doctor_id),  
    diagnosis TEXT,  
    treatment TEXT,  
    notes TEXT,  
    visit_date DATE  
);
```

```
CREATE TABLE Shift (  
    shift_id SERIAL PRIMARY KEY,  
    staff_id INT REFERENCES Staff(staff_id),  
    start_time TIME,  
    end_time TIME,  
    shift_date DATE  
);
```

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## 5. Summary

This system design aims to modernize a small clinic's operations by digitizing patient records, managing medical staff and appointments, and improving service delivery. The modular and scalable architecture supports easy enhancements and integrations, ensuring long-term sustainability and data security.