ABSTRACT FOR MAIN PROJECT — CARE CONNECT

Care Connect is an advanced, intelligent, and fully integrated palliative care management ecosystem designed to enhance the coordination, efficiency, and accessibility of long-term healthcare services. Building upon the capabilities of the initial mini project, the main project introduces a comprehensive suite of next-generation features—**AI-powered risk prediction, telemedicine support, automated analytics dashboards, lab report processing using OCR, AI-driven chatbot assistance, pharmacy and billing integration, and a dedicated used-equipment sale module**—transforming Care Connect into a holistic digital healthcare platform.

At its core, Care Connect serves as a unified system connecting doctors, nurses, patients, administrators, pharmacists, laboratory technicians, family members, and community volunteers. The platform enables seamless management of patient records, vitals tracking, medication planning, care updates, and appointments through an intuitive and role-specific interface. The addition of **AI-Based Health Risk Prediction** enhances clinical decision-making by analyzing patient vitals, lab results, symptoms, and historical trends to identify early warning signals for deteriorating health conditions. This predictive engine empowers caregivers to intervene proactively, improving patient safety and outcomes.

To support remote care and improve accessibility, the system integrates a **Doctor–Patient Video Consultation module** using WebRTC, enabling real-time virtual consultations, report review, treatment discussions, and follow-up care. Patients and doctors can share documents during the call, ensuring continuity of care even from remote locations. Care Connect further incorporates an intelligent **AI Chatbot**, capable of assisting patients with basic health queries, medication reminders, appointment booking, and general platform navigation—thereby reducing workload on caregivers and increasing patient engagement.

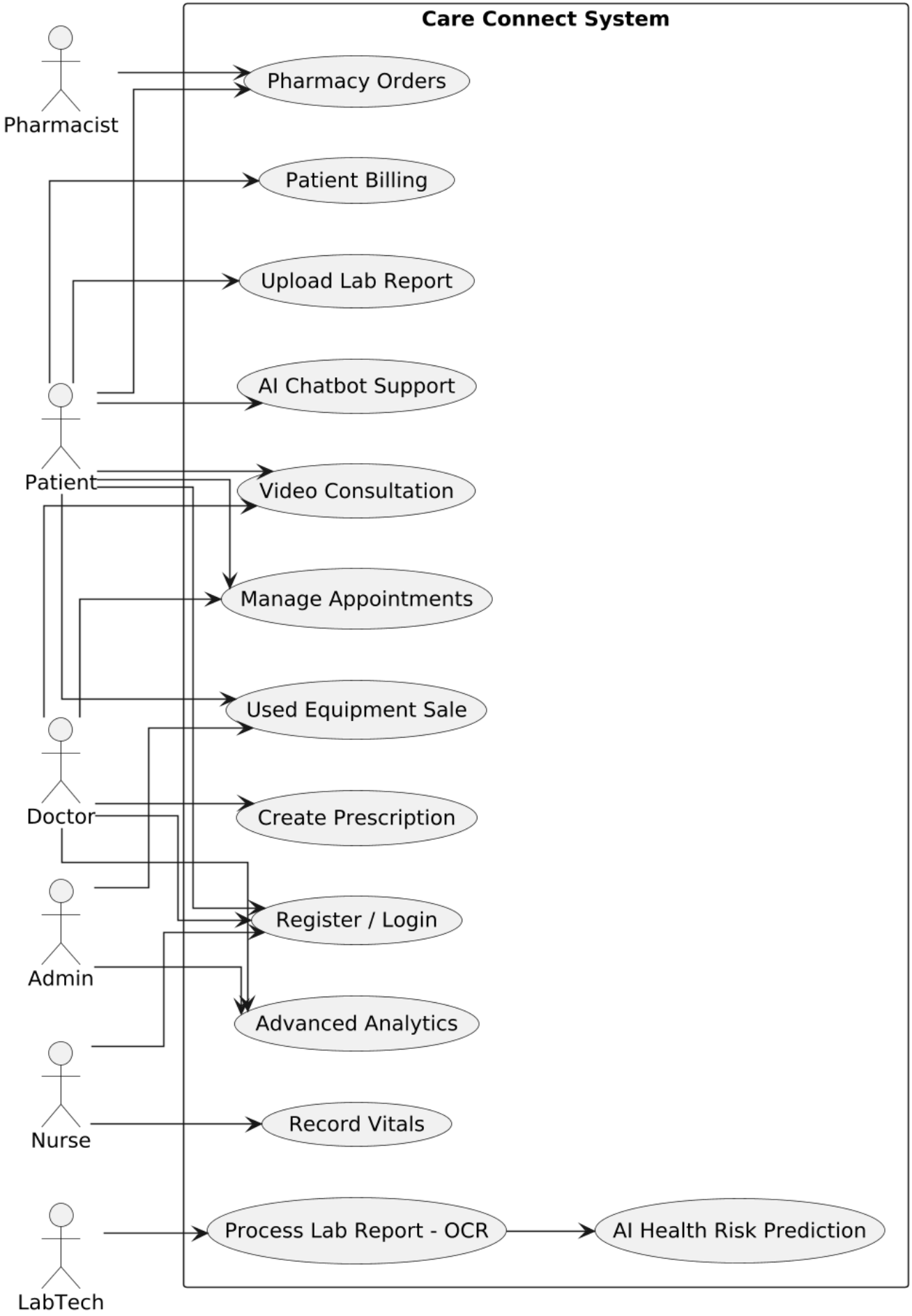
A major enhancement in the main project is the **Lab Report Processing module**, which uses OCR and text extraction to convert uploaded medical reports into structured, analyzable data. This information is automatically integrated with the AI prediction engine, allowing deeper analysis and more accurate health risk assessments. Complementing this is the **Advanced Analytics Dashboard**, which visualizes patient trends, staff performance, consultation statistics, and emergency events, supporting data-driven decision-making for doctors and administrators.

The platform also integrates essential operational modules such as **Pharmacy Management and Patient Billing**, enabling digital prescription handling, medicine ordering, invoice generation, and payment tracking. A dedicated **Used Equipment Sale module** allows patients and families to list or purchase medical equipment—such as wheelchairs, oxygen cylinders, and hospital beds—facilitating affordability and accessibility in palliative care settings.

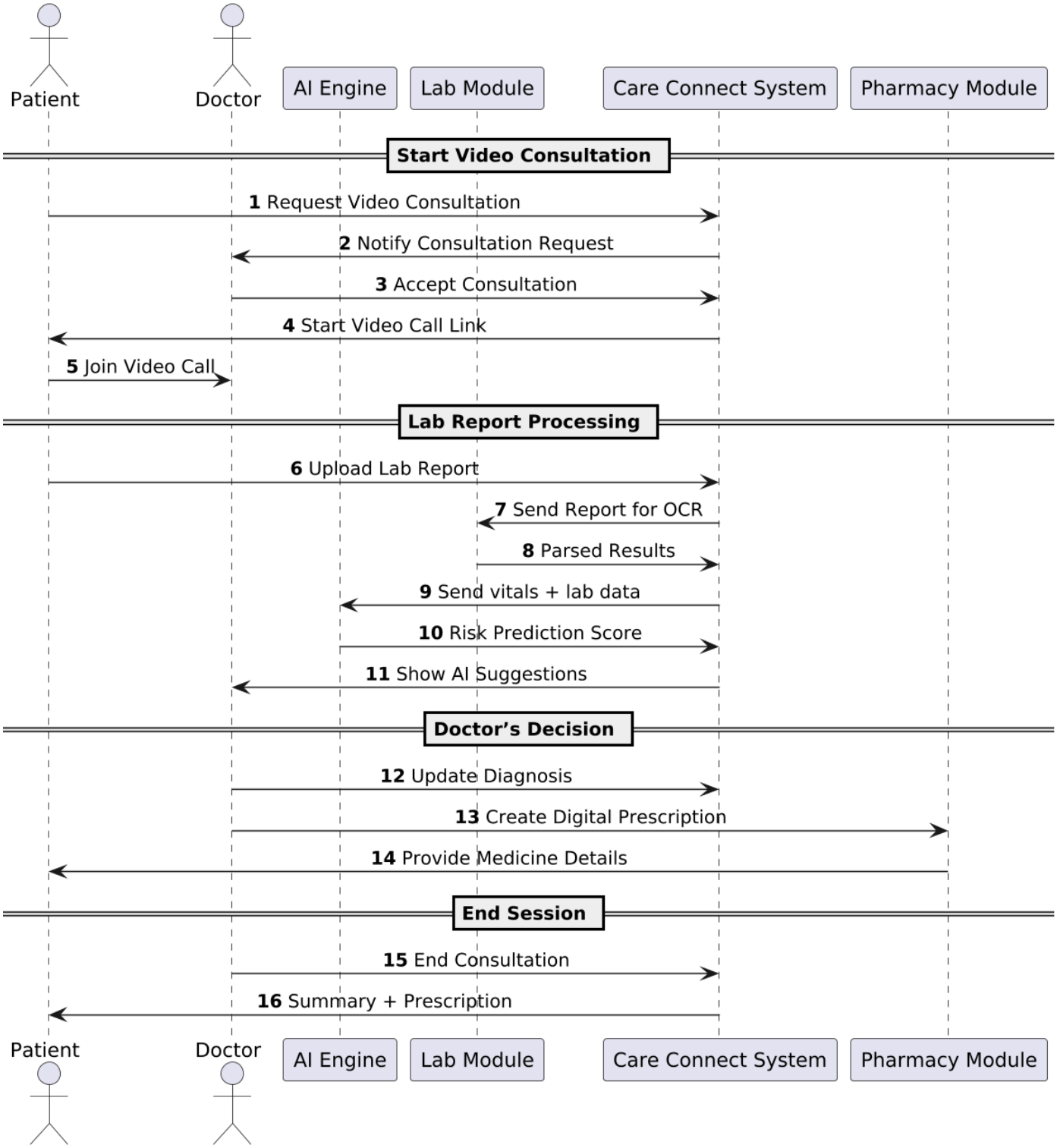
From a technical perspective, Care Connect is developed using the **MERN stack** (React + TypeScript, Node.js/Express, MongoDB), ensuring robust performance, flexibility, and scalability. Real-time communication is powered by Socket.IO, while secure authentication is achieved through JWT and OAuth. The system is hosted on cloud platforms such as Render and MongoDB Atlas, ensuring reliability, security, and high availability.

By integrating intelligent AI services, telemedicine, analytics, billing, and operational modules into a single unified platform, Care Connect significantly modernizes the palliative care workflow. It enhances communication among caregivers, improves clinical accuracy, streamlines administrative tasks, and empowers patients and families with continuous digital support. Ultimately, Care Connect stands as a comprehensive, scalable, and human-centered healthcare solution, designed to deliver compassionate, efficient, and proactive palliative care in both clinical and home environments.

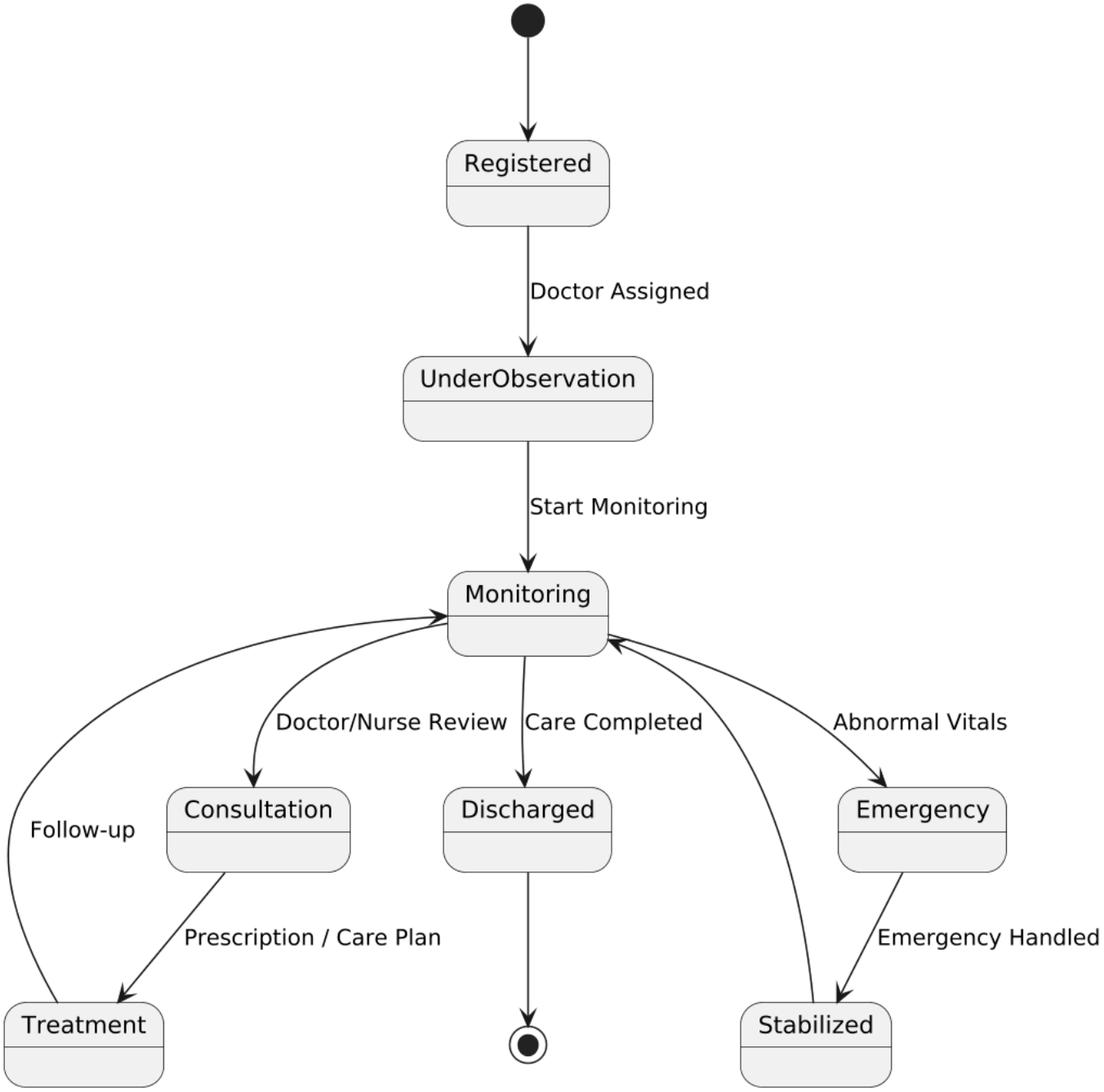
USE CASE DIAGRAM



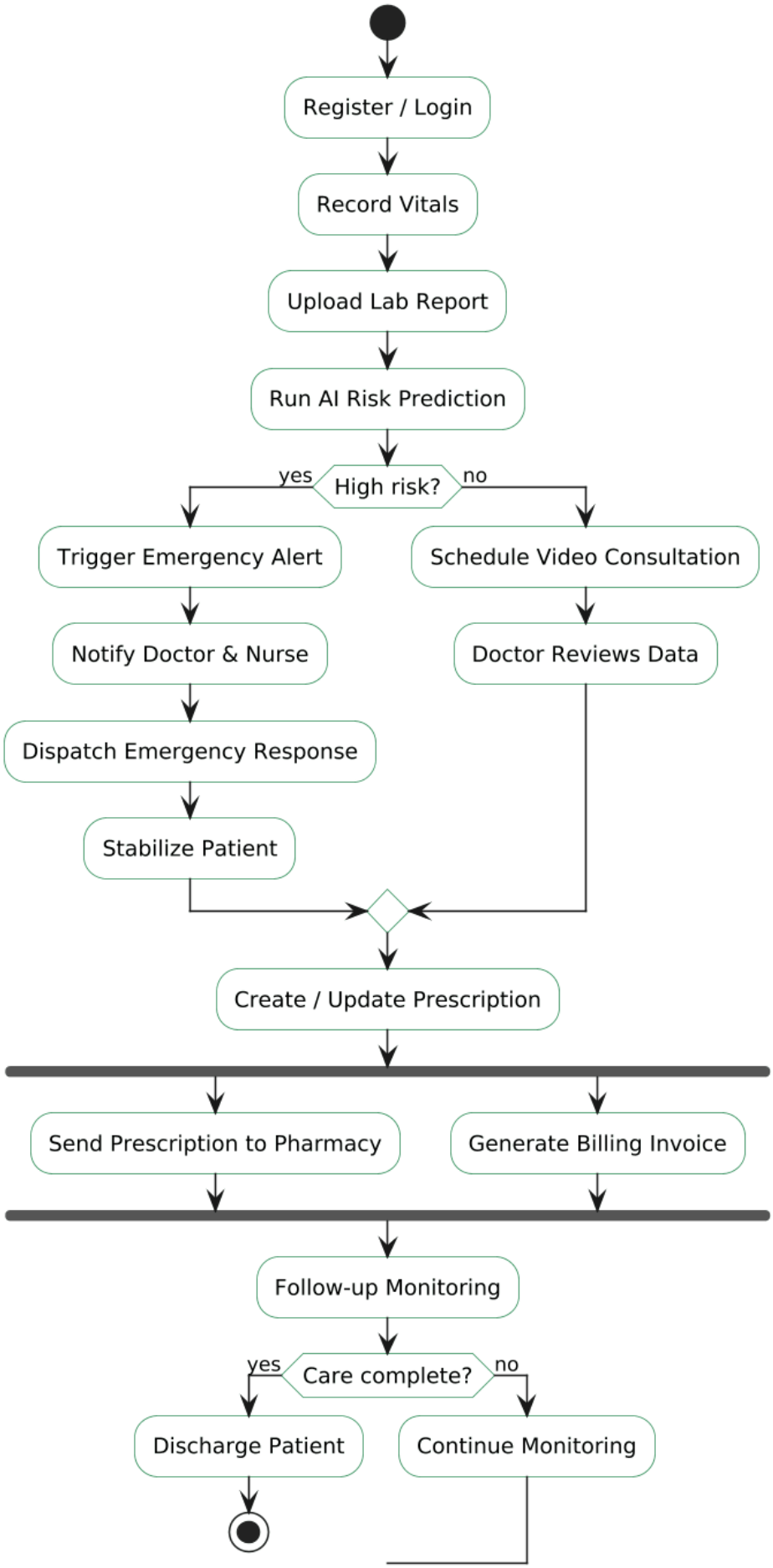
SEQUENCE DIAGRAM



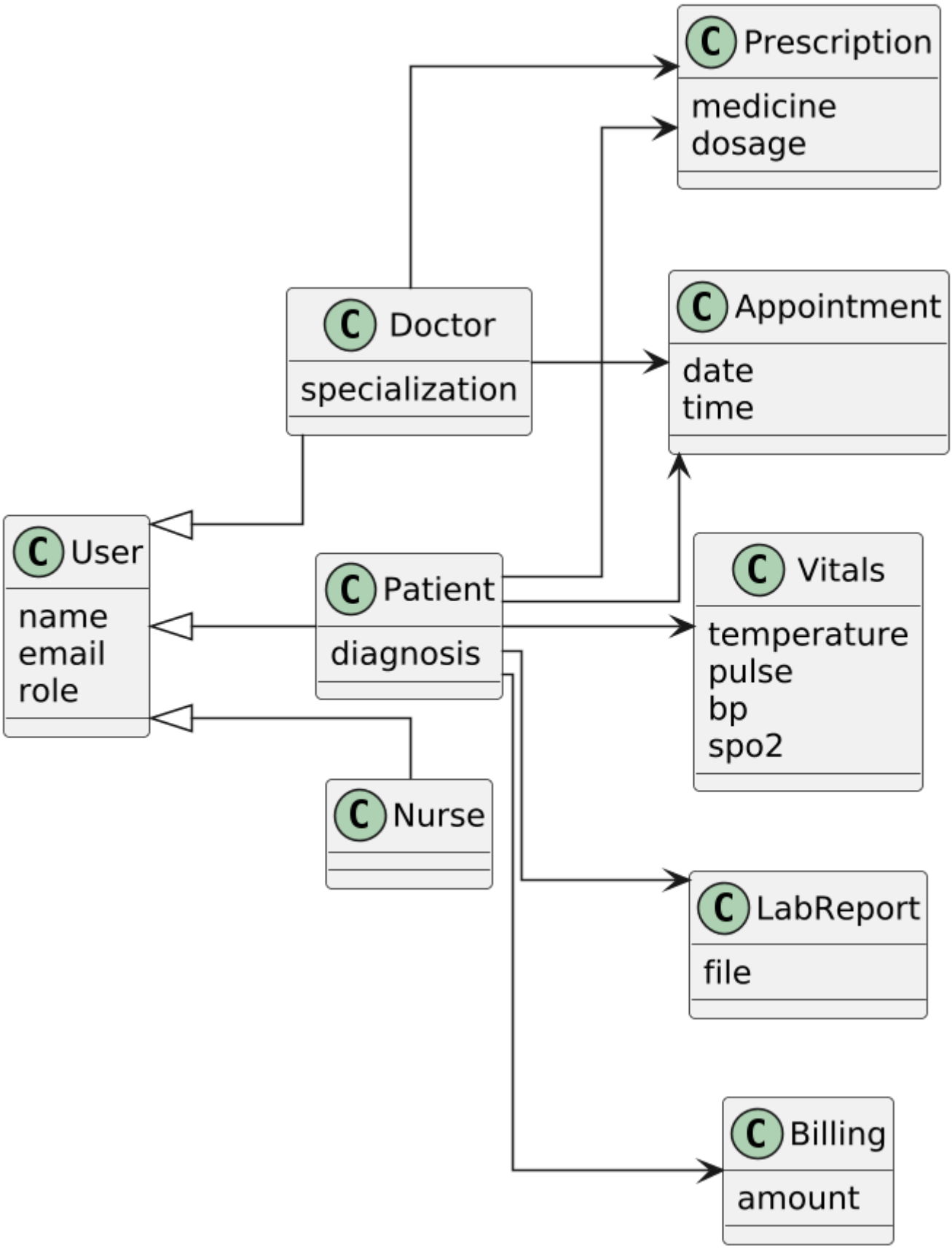
STATE CHART DIAGRAM



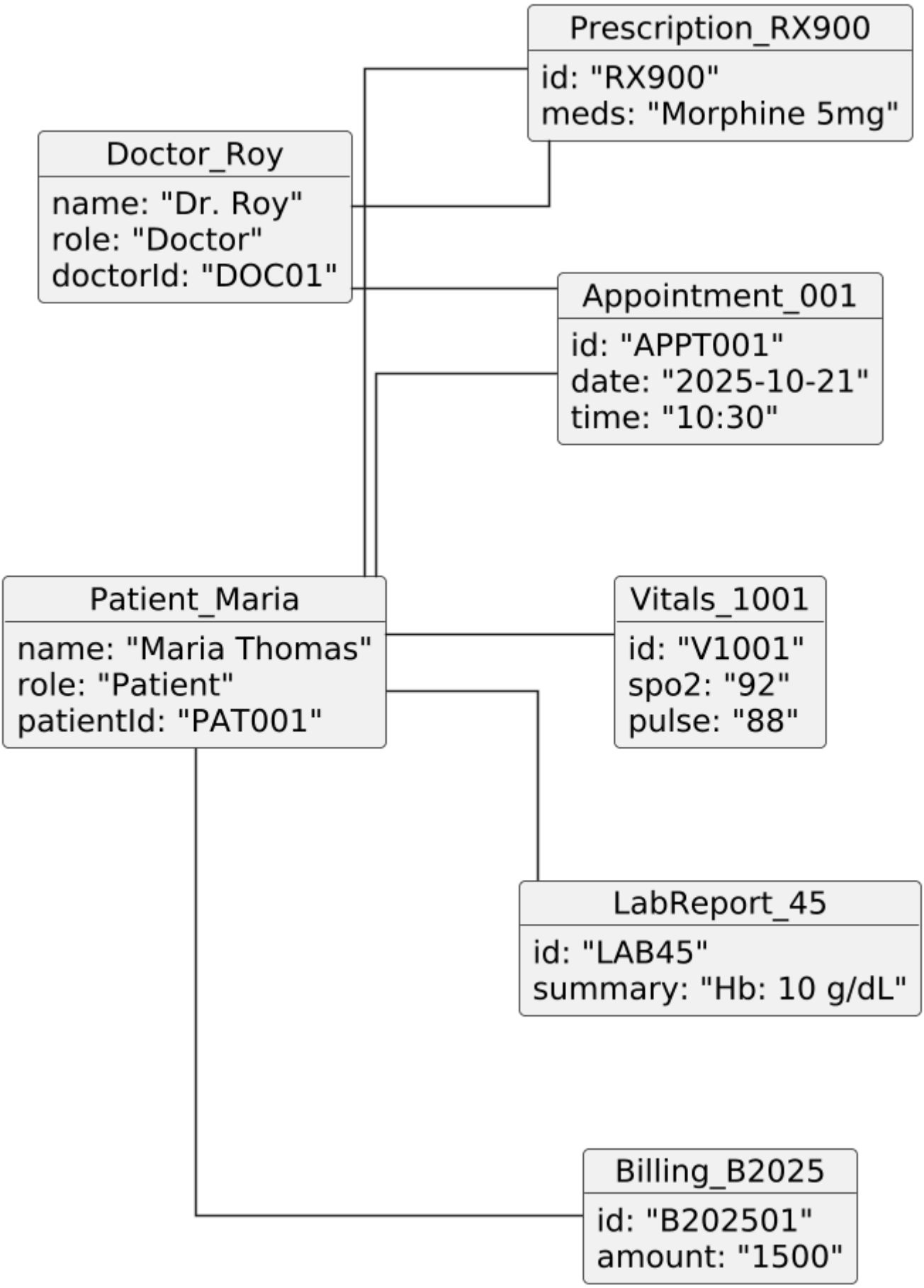
ACTIVITY DIAGRAM



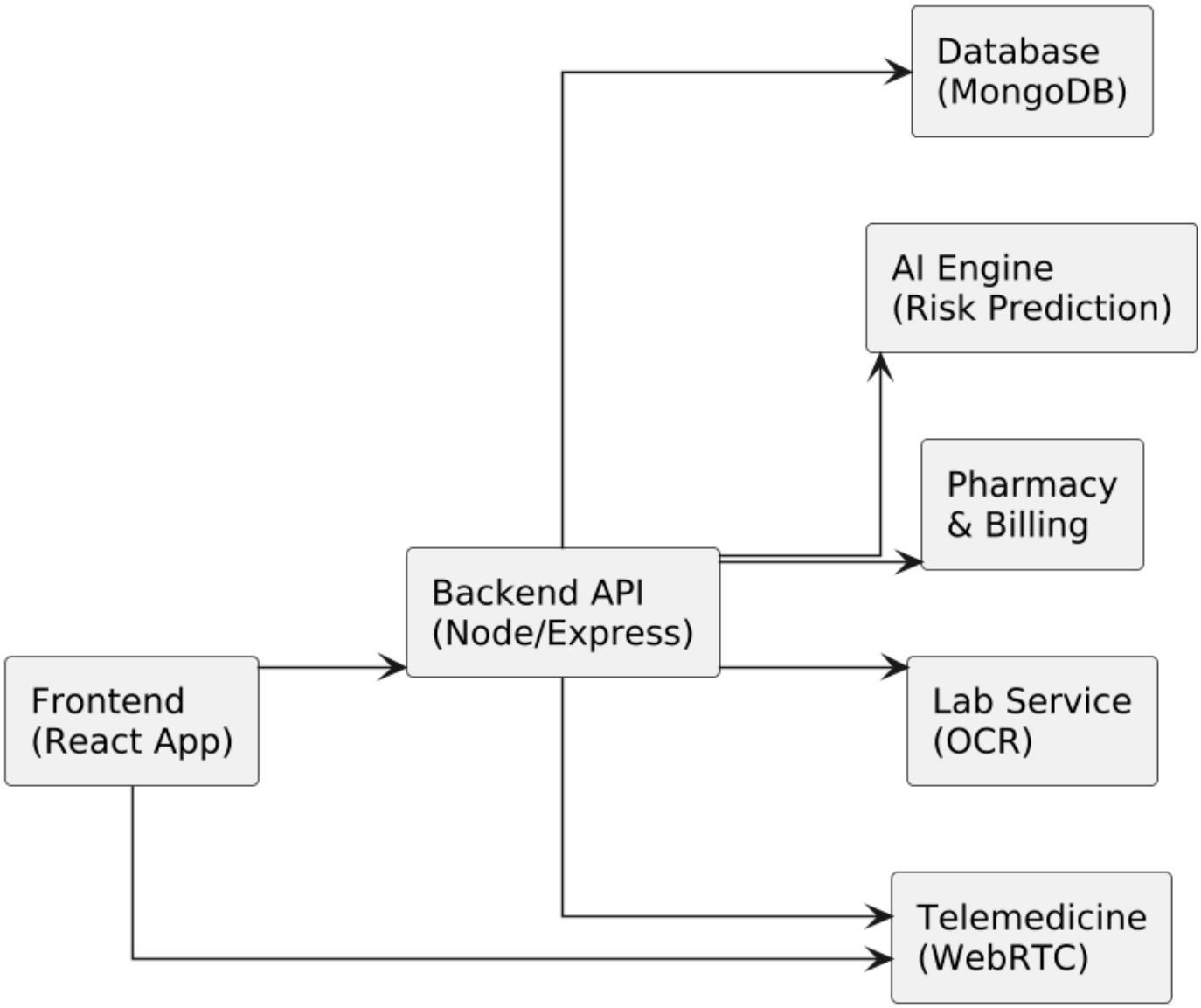
CLASS DIAGRAM



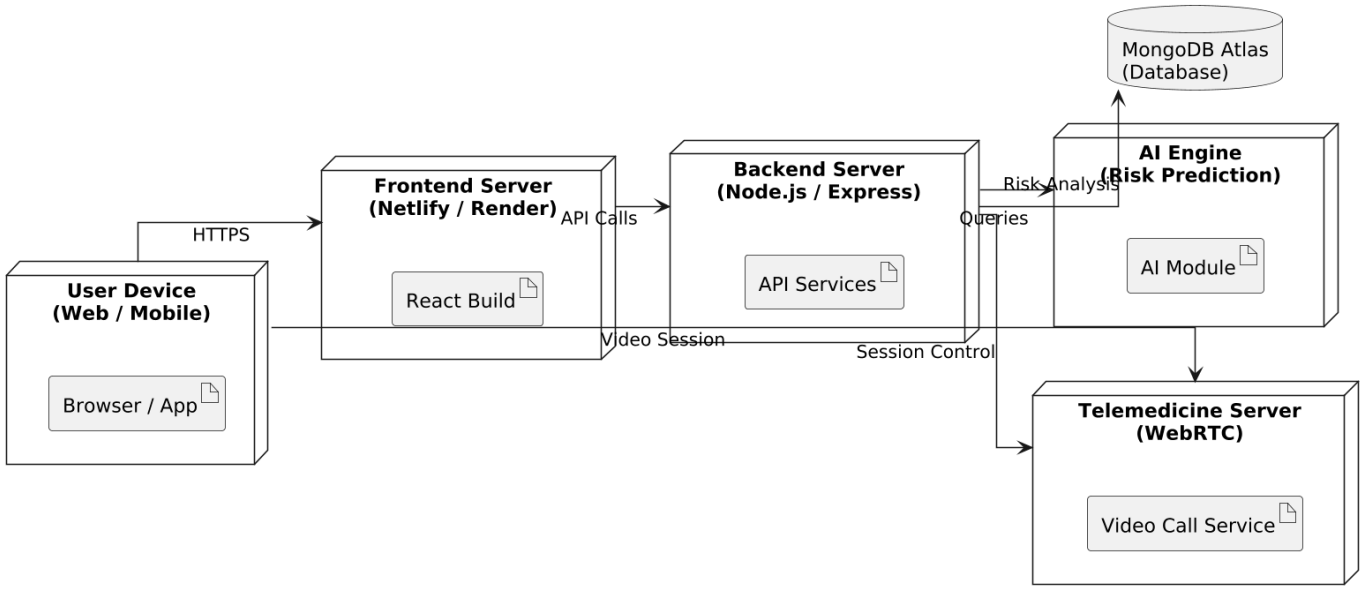
OBJECT DIAGRAM



COMPONENT DIAGRAM



DEPLOYMENT DIAGRAM



1. USERS TABLE

Stores all registered system users (Admin, Doctor, Nurse, Patient, Family, Pharmacist).

Field Name	Data Type	Constraints	Description
user_id	ObjectId / INT PK	Primary Key	Unique user identifier
name	VARCHAR(120)	NOT NULL	User name
email	VARCHAR(150)	UNIQUE, NOT NULL	Login email
password	VARCHAR(255)	NOT NULL	Hashed password
role	ENUM	NOT NULL	admin/doctor/nurse/patient/family/pharmacist
contact_no	VARCHAR(15)	NULL	Phone number
address	VARCHAR(255)	NULL	Address
created_at	DATETIME	NOT NULL	Registration timestamp

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2. PATIENTS TABLE

Profile + medical details of patients.

Field Name	Data Type	Constraints
patient_id	ObjectId PK	Primary Key
user_id	FK(users)	NOT NULL, UNIQUE
age	INT	NULL
gender	VARCHAR(10)	NULL
diagnosis	VARCHAR(255)	NULL
care_stage	VARCHAR(50)	NULL (e.g., mild, critical)
assigned_doctor	FK(users)	NULL
created_at	DATETIME	NOT NULL

3. VITALS TABLE

Stores vitals recorded by nurses.

Field Name	Data Type	Constraints
vitals_id	ObjectId PK	Primary Key
patient_id	FK(patients)	NOT NULL
temperature	FLOAT	NULL
pulse_rate	INT	NULL
blood_pressure	VARCHAR(10)	NULL
spo2	INT	NULL
recorded_at	DATETIME	NOT NULL

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4. APPOINTMENTS TABLE

Manages doctor–patient appointments.

Field Name	Data Type	Constraints
appointment_id	ObjectId PK	Primary Key
doctor_id	FK(users)	NOT NULL
patient_id	FK(patients)	NOT NULL
date	DATETIME	NOT NULL
type	VARCHAR(20)	e.g., “Video”, “In-person”
notes	TEXT	NULL

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5. VIDEO CONSULTATION TABLE

Stores details of each telemedicine session.

Field Name	Data Type	Constraints
session_id	ObjectId PK	Primary Key
doctor_id	FK(users)	NOT NULL
patient_id	FK(patients)	NOT NULL
start_time	DATETIME	NOT NULL
end_time	DATETIME	NULL
status	ENUM("active","completed")	NOT NULL

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6. PRESCRIPTIONS TABLE

Field Name	Data Type	Constraints
prescription_id	ObjectId PK	Primary Key
doctor_id	FK(users)	NOT NULL
patient_id	FK(patients)	NOT NULL
medicine_name	VARCHAR(100)	NOT NULL
dosage	VARCHAR(50)	NULL
frequency	VARCHAR(50)	NULL
start_date	DATE	NOT NULL
end_date	DATE	NULL

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7. PHARMACY ORDERS TABLE

Field Name	Data Type	Constraints
order_id	ObjectId PK	Primary Key
prescription_id	FK(prescriptions)	NOT NULL
patient_id	FK(patients)	NOT NULL
status	ENUM("Pending","Completed")	NOT NULL
ordered_at	DATETIME	NOT NULL

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8. BILLING TABLE

Field Name	Data Type	Constraints
bill_id	ObjectId PK	Primary Key
patient_id	FK(patients)	NOT NULL
amount	DECIMAL(10,2)	NOT NULL
status	ENUM("Unpaid","Paid")	NOT NULL
created_at	DATETIME	NOT NULL

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9. LAB REPORTS TABLE

Field Name	Data Type	Constraints
report_id	ObjectId PK	Primary Key
patient_id	FK(patients)	NOT NULL
file_url	VARCHAR(255)	NOT NULL
parsed_text	TEXT	NULL
summary	VARCHAR(255)	NULL
uploaded_at	DATETIME	NOT NULL

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10. AI RISK PREDICTION TABLE

Field Name	Data Type	Constraints
prediction_id	ObjectId PK	Primary Key
patient_id	FK(patients)	NOT NULL
risk_level	ENUM("Low","Moderate","High")	NOT NULL
factors_used	TEXT	e.g., vitals + lab values
predicted_at	DATETIME	NOT NULL

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11. EQUIPMENT TABLE

Field Name	Data Type	Constraints
equipment_id	ObjectId PK	Primary Key
name	VARCHAR(100)	NOT NULL
condition	VARCHAR(50)	NOT NULL
availability	BOOLEAN	NOT NULL

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12. USED EQUIPMENT SALE TABLE

Field Name	Data Type	Constraints
sale_id	ObjectId PK	Primary Key
equipment_id	FK(equipment)	NOT NULL
seller_id	FK(users)	NOT NULL
buyer_id	FK(users)	NULL
price	DECIMAL(10,2)	NOT NULL
status	ENUM("Listed","Sold")	NOT NULL

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13. NOTIFICATION TABLE

Field Name	Data Type	Constraints
notification_id	ObjectId PK	Primary Key
user_id	FK(users)	NOT NULL
message	TEXT	NOT NULL
status	ENUM("Unread","Read")	NOT NULL
created_at	DATETIME	NOT NULL