

# **CS 306 PROJECT PHASE 1**

## **HOSPITAL MANAGEMENT SYSTEM**

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## **Project Title:** Hospital Management System

### **1. Project Description**

This project implements a database for the Hospital Management System, which manages and stores information about day-to-day operations of a hospital, providing an integrated system that handles patient information, doctor schedules, appointments, prescriptions, billing, and laboratory tests.

### **Entities**

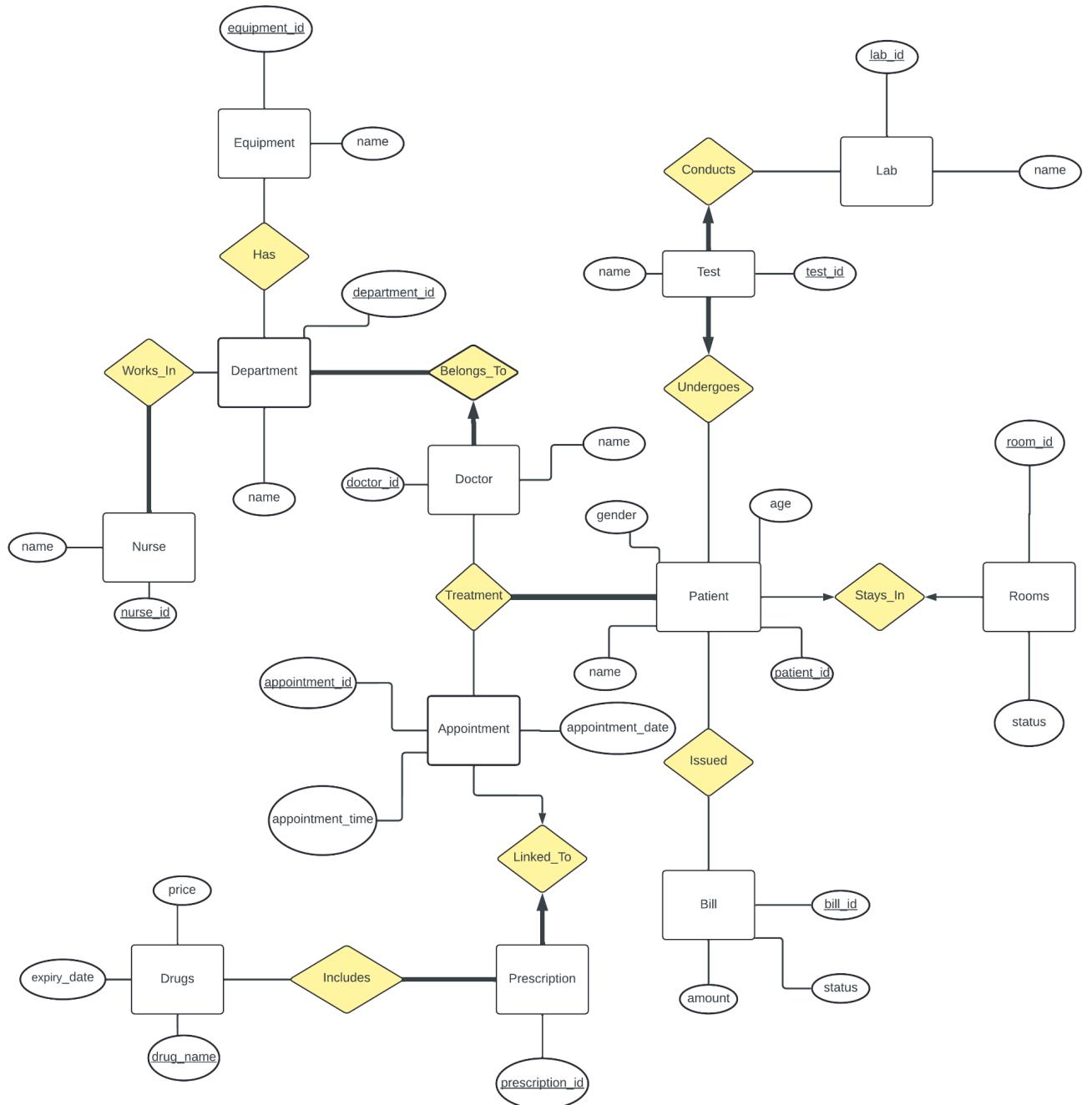
Entities in the project include:

- **Department**, which has **Equipment**, and is the place where **Nurse** and **Doctor** works in.
- **Patient** who is treated by Doctor(s), stays in a **Room**, and is issued a **Bill**.
- **Tests** that Patients undergo, and are conducted in a **Lab**.
- **Appointment**, which is part of a Treatment, and is linked to a **Prescription**.
- **Drug** that is included in a Prescription.

The goal of the project is to create a comprehensive database that can effectively manage and store data related to patients, doctors, nurses, departments, medical tests, and treatments, providing a streamlined approach to hospital management.

The database also features some relationships between those entities, such as **works\_in**, **belongs\_to**, **treatment**, **undergoes**, **linked\_to**, and **stays\_in** to accurately represent the real-world interactions among patients, healthcare professionals, departments, and equipment.

## 2.ER Model



### 3.Relational Model

```
CREATE TABLE Department (
    department_id INT PRIMARY KEY,
    name VARCHAR(100) NOT NULL
);
```

	department_id	name
▶	1	Cardiology
	2	Neurology
	3	Orthopedics
	4	Pediatrics
	5	Radiology
	6	Emergency
	7	Oncology
	8	General Surgery
	9	Dermatology
	10	Gastroenterology
*	NULL	NULL

```
CREATE TABLE Nurse (
    nurse_id INT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    department_id INT,
    FOREIGN KEY (department_id) REFERENCES Department(department_id)
);
```

	nurse_id	name	department_id
▶	2565	Grace Lee	2
	5247	Jack Taylor	8
	5532	Isla Scott	7
	5541	Frank Thompson	4
	7400	Alice Johnson	7
	8080	Emily Clark	8
	8505	Cathy Brown	1
	8664	David Wilson	1
	8874	Henry King	1
	9216	Bob Smith	8
*	NULL	NULL	NULL

```

CREATE TABLE Doctor (
    doctor_id INT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    department_id INT,
    FOREIGN KEY (department_id) REFERENCES Department(department_id)
);

```

	doctor_id	name	department_id
▶	877	Dr. Jane Smith	1
	4694	Dr. Olivia Lewis	3
	4762	Dr. David Thompson	4
	6139	Dr. Michael Brown	8
	6337	Dr. Ethan White	6
	7581	Dr. Emily Davis	8
	8049	Dr. Henry King	7
	8162	Dr. Grace Scott	5
	8422	Dr. Sarah Johnson	1
	9900	Dr. John Doe	9
	NULL	NULL	NULL

```

CREATE TABLE Patient (
    patient_id INT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    age INT,
    gender VARCHAR(10)
);

```

	patient_id	name	age	gender
▶	92	Selin Kaya	24	Female
	113	Hayko Cepkin	24	Male
	123	Neriman Gudu	65	Female
	127	John Brown	76	Male
	203	Sophie Clairo	12	Female
	222	Alex Demir	5	Male
	450	Taner Tolga	15	Male
	467	Ege Yilmaz	11	Male
	601	Ahmet Yurt	18	Male
	698	Hakan Sayar	89	Male
	930	Gonul Kirmizi	46	Female
*	NULL	NULL	NULL	NULL

```

CREATE TABLE Appointment (
    appointment_id INT PRIMARY KEY,
    doctor_id INT,
    patient_id INT,
    appointment_date DATE,
    FOREIGN KEY (doctor_id) REFERENCES Doctor(doctor_id),
    FOREIGN KEY (patient_id) REFERENCES Patient(patient_id)
);

```

	appointment_id	doctor_id	patient_id	appointment_date
▶	1	877	92	2024-11-01
	2	4694	113	2024-11-02
	3	4762	123	2024-11-03
	4	6139	127	2024-11-04
	5	6337	203	2024-11-05
	6	7581	222	2024-11-06
	7	8049	450	2024-11-07
	8	8162	467	2024-11-08
	9	8422	601	2024-11-09
	10	9900	698	2024-11-10
*	HULL	HULL	HULL	HULL

```

CREATE TABLE Rooms (
    room_id INT PRIMARY KEY,
    room_status INT
);

```

	room_id	room_status
▶	1263	0
	3910	1
	4135	1
	5943	1
	7181	1
	7225	0
	7497	0
	8296	1
	9470	0
	9804	0
*	HULL	HULL

```

CREATE TABLE Stays_In (
    stay_id INT PRIMARY KEY,
    patient_id INT,
    room_id INT,
    start_date DATE,
    end_date DATE,
    FOREIGN KEY (patient_id) REFERENCES Patient(patient_id),
    FOREIGN KEY (room_id) REFERENCES Rooms(room_id));

```

	stay_id	patient_id	room_id	start_date	end_date
▶	1	92	1263	2024-11-01	2024-11-10
	2	113	3910	2024-11-02	2024-11-12
	3	123	4135	2024-11-03	2024-11-13
	4	127	5943	2024-11-04	2024-11-14
	5	203	7181	2024-11-05	2024-11-15
	6	222	7225	2024-11-06	2024-11-16
	7	450	7497	2024-11-07	2024-11-17
	8	467	8296	2024-11-08	2024-11-18
	9	601	9470	2024-11-09	2024-11-19
	10	698	9804	2024-11-10	2024-11-20
*	NULL	NULL	NULL	NULL	NULL

```

CREATE TABLE Bill (
    bill_id INT PRIMARY KEY,
    appointment_id INT,
    amount DECIMAL(10, 2),
    status VARCHAR(50),
    FOREIGN KEY (appointment_id) REFERENCES Appointment(appointment_id)
);

```

	bill_id	appointment_id	amount	status
▶	1	4	250.00	Paid
	2	2	300.50	Unpaid
	3	7	150.75	Paid
	4	1	500.00	Unpaid
	5	9	450.25	Paid
	6	5	220.00	Unpaid
	7	8	100.00	Paid
	8	10	375.00	Unpaid
	9	6	180.00	Paid
	10	3	400.00	Unpaid
*	NULL	NULL	NULL	NULL

```

CREATE TABLE Prescription (
    prescription_id INT PRIMARY KEY,
    appointment_id INT,
    FOREIGN KEY (appointment_id) REFERENCES Appointment(appointment_id)
);

```

	prescription_id	appointment_id
▶	2	1
	6	2
	1	3
	8	4
	4	5
	7	6
	3	7
	9	8
	5	9
	10	10
*	NULL	NULL

```

CREATE TABLE Drugs (
    drug_id INT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    price DECIMAL(10, 2),
    expiry_date DATE
);

```

	drug_id	name	price	expiry_date
▶	1	Paracetamol	5.50	2025-06-15
	2	Ibuprofen	8.25	2025-08-20
	3	Amoxicillin	12.00	2026-01-10
	4	Cetirizine	4.75	2025-09-12
	5	Aspirin	6.00	2025-12-05
	6	Metformin	15.30	2026-03-01
	7	Lisinopril	18.50	2026-05-18
	8	Atorvastatin	20.00	2026-07-25
	9	Azithromycin	10.75	2025-11-30
	10	Omeprazole	9.50	2025-10-20
*	NULL	NULL	NULL	NULL

```

CREATE TABLE Includes (
    prescription_id INT,
    drug_id INT,
    PRIMARY KEY (prescription_id, drug_id),
    FOREIGN KEY (prescription_id) REFERENCES Prescription(prescription_id),
    FOREIGN KEY (drug_id) REFERENCES Drugs(drug_id)
);

```

	prescription_id	drug_id
▶	3	1
	5	2
	1	3
	6	4
	2	5
	8	6
	7	7
	4	8
	9	9
	10	10
*	NULL	NULL

```

CREATE TABLE Lab (
    lab_id INT PRIMARY KEY,
    name VARCHAR(100) NOT NULL
);

```

	lab_id	name
▶	101	Pathology Lab
	102	Radiology Lab
	103	MRI Lab
	104	Biochemistry Lab
	105	CT Scan Lab
	106	Cardiology Lab
	107	Microbiology Lab
	108	Hematology Lab
	109	Allergy Testing Lab
	110	Virology Lab
*	NULL	NULL

```

CREATE TABLE Test (
    test_id INT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    lab_id INT,
    FOREIGN KEY (lab_id) REFERENCES Lab(lab_id)
);

```

	test_id	name	lab_id
▶	1	Blood Test	101
	2	X-Ray	102
	3	MRI Scan	103
	4	Urine Test	104
	5	CT Scan	105
	6	ECG	106
	7	Liver Function Test	107
	8	Cholesterol Test	108
	9	Allergy Test	109
	10	COVID-19 Test	110
*	NULL	NULL	NULL

```

CREATE TABLE Conducts (
    lab_id INT,
    test_id INT,
    PRIMARY KEY (lab_id, test_id),
    FOREIGN KEY (lab_id) REFERENCES Lab(lab_id),
    FOREIGN KEY (test_id) REFERENCES Test(test_id)
);

```

	lab_id	test_id
▶	101	1
	102	2
	103	3
	104	4
	105	5
	106	6
	107	7
	108	8
	109	9
	110	10
*	NULL	NULL

```

CREATE TABLE Undergoes (
    undergo_id INT PRIMARY KEY,
        patient_id INT,
        test_id INT,
FOREIGN KEY (patient_id) REFERENCES Patient(patient_id),
FOREIGN KEY (test_id) REFERENCES Test(test_id)
);

```

	undergo_id	patient_id	test_id
▶	1	92	1
	2	113	2
	3	123	3
	4	127	4
	5	203	5
	6	222	6
	7	450	7
	8	467	8
	9	601	9
	10	698	10
*	NULL	NULL	NULL

```

CREATE TABLE Equipment (
    equipment_id INT PRIMARY KEY,
    name VARCHAR(100) NOT NULL
);

```

	equipment_id	name
▶	1	X-Ray Machine
	2	MRI Scanner
	3	CT Scanner
	4	Ultrasound Machine
	5	ECG Machine
	6	Defibrillator
	7	Ventilator
	8	Anesthesia Machine
	9	Surgical Table
	10	Infusion Pump
*	NULL	NULL

```
CREATE TABLE Has (
    department_id INT,
    equipment_id INT,
    PRIMARY KEY (department_id, equipment_id),
    FOREIGN KEY (department_id) REFERENCES Department(department_id),
    FOREIGN KEY (equipment_id) REFERENCES Equipment(equipment_id)
);
```

	department_id	equipment_id
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
*	NULL	NULL