

Hospital Management System

Project Report

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What is DBMS?

- Database Management System (DBMS) is a **software designed to define, manipulate, retrieve and manage data in a database.**
 - e.g. MS SQL Server, Oracle, My SQL, SQLite, MongoDB etc.

Application of DBMS:

- DBMS is required where ever data need to be stored.
 - ↳ E-Commerce (Flipkart, Amazon, Tata Neu, eBay etc...)
 - ↳ Online Television Streaming (Hotstar, Amazon Prime,Netflix etc...)
 - ↳ Social Media (WhatsApp, Instagram, Twitter, LinkedIn etc...)
 - ↳ Banking
 - ↳ Airline
 - ↳ Universities and Colleges/Schools

- ↳ Library Management System
- ↳ Human Resource Department
- ↳ Hospitals and Medical Stores
- ↳ Government Organizations
- ↳ Insurance
- ↳ Railway
- ↳ Rental Systems (Ola, Uber etc...)

Advantages of DBMS:

- Reduce data redundancy (duplication)
 - ↳ **Avoids unnecessary duplication** of data by storing data centrally.
- Remove data inconsistency
 - ↳ **By eliminating redundancy, data inconsistency can be removed.**
- Data isolation
 - ↳ A user can **easily retrieve proper data** as per his/her requirement.

- Guaranteed atomicity
 - ↳ Either transaction **executes 0% or 100%.**
- Allow implementing integrity constraints
 - ↳ **Business rules can be implemented** such as do not allow to store amount less than Rs. 0 in balance.
- Sharing of data among multiple users
 - ↳ **More than one users can access** same data at the same time.
- Restricting unauthorized access to data
 - ↳ A user can **only access data which is authorized** to him/her.
- Providing backup and recovery services
 - ↳ **Can take a regular auto or manual backup** and **use it to restore** the database if it corrupts.

Hospital Management System

Objective:

The objective of a hospital management system is to streamline and automate the various processes and operations of a hospital or healthcare facility, such as patient registration, appointment scheduling, medical billing and coding, inventory management, and electronic health records, in order to improve overall efficiency, reduce costs, and enhance the quality of patient care

Overview:

Hospital Management System (HMS) is a comprehensive software solution that facilitates the efficient management of various administrative, operational, and clinical aspects of a hospital or healthcare facility. It is designed to streamline and automate the day-to-day operations of a hospital, improving patient care, optimizing resource utilization, and enhancing overall hospital performance.

Application:

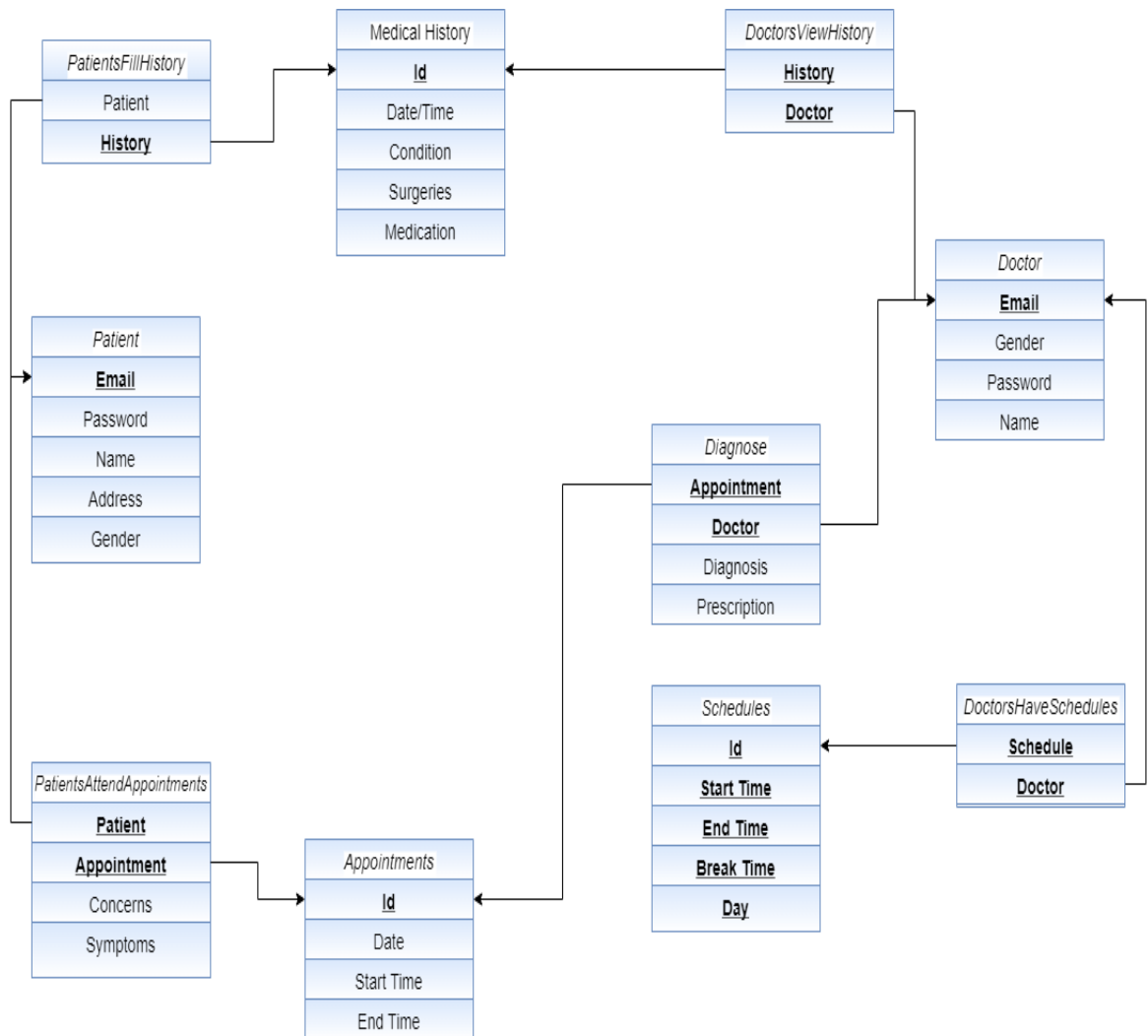
A hospital management system is a software application that is designed to streamline the operations of healthcare facilities such as hospitals, clinics, and medical centers. This system allows healthcare providers to manage patient records, appointment scheduling, billing, inventory management, and other administrative tasks. By

implementing a hospital management system, healthcare facilities can improve efficiency, reduce errors, enhance patient care, and provide better access to information for medical staff, administrators, and patients. Additionally, it can also help hospitals to comply with regulatory requirements and maintain accurate financial records.

List of Tables

- Appointment (id , date , starttime , endtime ,)
- Diagnose (appt , doctor , diagnosis , prescription)
- DocsHaveSchedules (sched , doctor)
- Doctor (email , gender , password , name)
- DoctorViewsHistory (history , doctor)
- medicalHistory (id , date , conditions , surgeries , medication)
- patient (Email , Password , Name , Address , Gender)
- patientsattendappointments (patient , appt , concerns , symptoms,)
- patientsfillhistory (patient , history)
- schedule (id , starttime , endtime , breaktime , day)

Relational Diagram



ER- Diagram

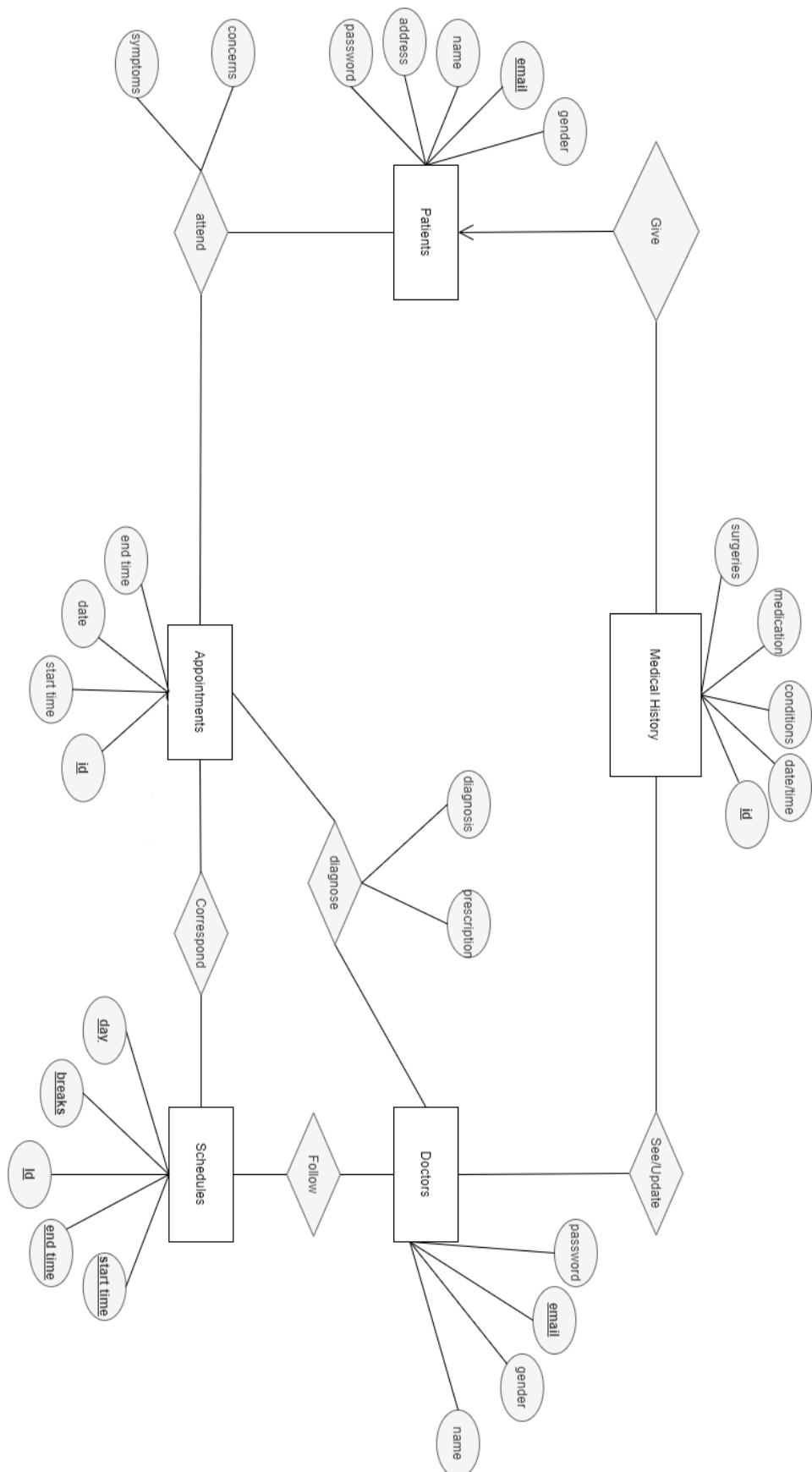


Table creation :

```
CREATE TABLE Patient(  
email varchar(50) PRIMARY KEY,  
password varchar(30) NOT NULL,  
name varchar(50) NOT NULL,  
address varchar(60) NOT NULL,  
gender VARCHAR(20) NOT NULL  
);
```

```
CREATE TABLE MedicalHistory(  
id int PRIMARY KEY,  
date DATE NOT NULL,  
conditions VARCHAR(100) NOT NULL,  
surgeries VARCHAR(100) NOT NULL,  
medication VARCHAR(100) NOT NULL  
);
```

```
CREATE TABLE Doctor(
```

```
email varchar(50) PRIMARY KEY,  
gender varchar(20) NOT NULL,  
password varchar(30) NOT NULL,  
name varchar(50) NOT NULL  
);
```

```
CREATE TABLE Appointment(  
id int PRIMARY KEY,  
date DATE NOT NULL,  
starttime TIME NOT NULL,  
endtime TIME NOT NULL  
);
```

```
CREATE TABLE PatientsAttendAppointments(  
patient varchar(50) NOT NULL,  
appt int NOT NULL,  
concerns varchar(40) NOT NULL,  
symptoms varchar(40) NOT NULL,
```

FOREIGN KEY (patient) REFERENCES Patient (email) ON
DELETE CASCADE,

FOREIGN KEY (appt) REFERENCES Appointment (id) ON
DELETE CASCADE,

PRIMARY KEY (patient, appt)

);

CREATE TABLE Schedule(
id int NOT NULL,

starttime TIME NOT NULL,

endtime TIME NOT NULL,

breaktime TIME NOT NULL,

day varchar(20) NOT NULL,

PRIMARY KEY (id, starttime, endtime, breaktime, day)

);

CREATE TABLE PatientsFillHistory(
patient varchar(50) NOT NULL,

```
history int NOT NULL,  
  
FOREIGN KEY (patient) REFERENCES Patient (email) ON  
DELETE CASCADE,  
  
FOREIGN KEY (history) REFERENCES MedicalHistory (id)  
ON DELETE CASCADE,  
  
PRIMARY KEY (history)  
  
);
```

```
CREATE TABLE Diagnose(  
  
appt int NOT NULL,  
  
doctor varchar(50) NOT NULL,  
  
diagnosis varchar(40) NOT NULL,  
  
prescription varchar(50) NOT NULL,  
  
FOREIGN KEY (appt) REFERENCES Appointment (id) ON  
DELETE CASCADE,  
  
FOREIGN KEY (doctor) REFERENCES Doctor (email) ON  
DELETE CASCADE,  
  
PRIMARY KEY (appt, doctor)  
  
);
```

```
CREATE TABLE DocsHaveSchedules(  
    sched int NOT NULL,  
    doctor varchar(50) NOT NULL,  
    FOREIGN KEY (sched) REFERENCES Schedule (id) ON  
    DELETE CASCADE,  
    FOREIGN KEY (doctor) REFERENCES Doctor (email) ON  
    DELETE CASCADE,  
    PRIMARY KEY (sched, doctor)  
);  
  
CREATE TABLE DoctorViewsHistory(  
    history int NOT NULL,  
    doctor varchar(50) NOT NULL,  
    FOREIGN KEY (doctor) REFERENCES Doctor (email) ON  
    DELETE CASCADE,  
    FOREIGN KEY (history) REFERENCES MedicalHistory (id)  
    ON DELETE CASCADE,  
    PRIMARY KEY (history, doctor)  
);
```

Insertion of Data:

```
INSERT INTO Patient (email, password, name, address, gender)
```

```
VALUES
```

```
('patient1@example.com', 'password123', 'Patient 1', 'Address 425',  
'male'),
```

```
('patient2@example.com', 'password456', 'Patient 2', 'Address 662',  
'male'),
```

```
('patient3@example.com', 'password789', 'Patient 3', 'Address 793',  
'male'),
```

```
('patient4@example.com', 'passwordabc', 'Patient 4', 'Address 36',  
'female'),
```

```
('patient5@example.com', 'passworddef', 'Patient 5', 'Address 355',  
'male'),
```

```
('patient6@example.com', 'passwordghi', 'Patient 6', 'Address 946',  
'female'),
```

```
('patient7@example.com', 'passwordjkl', 'Patient 7', 'Address 820',  
'female'),
```

```
('patient8@example.com', 'passwordmno', 'Patient 8', 'Address  
985', 'male'),
```


('patient9@example.com', 'passwordpqr', 'Patient 9', 'Address 648', 'male'),

('patient10@example.com', 'passwordstu', 'Patient 10', 'Address 772', 'female'),

('patient11@example.com', 'passwordvwx', 'Patient 11', 'Address 929', 'male'),

('patient12@example.com', 'passwordyz1', 'Patient 12', 'Address 550', 'female'),

('patient13@example.com', 'password234', 'Patient 13', 'Address 11', 'male'),

('patient14@example.com', 'password567', 'Patient 14', 'Address 667', 'male'),

('patient15@example.com', 'password890', 'Patient 15', 'Address 892', 'male'),

('patient16@example.com', 'passwordabc1', 'Patient 16', 'Address 536', 'male'),

('patient17@example.com', 'passworddef2', 'Patient 17', 'Address 711', 'female'),

('patient18@example.com', 'passwordghi3', 'Patient 18', 'Address 865', 'female'),

('patient19@example.com', 'passwordjkl4', 'Patient 19', 'Address 22', 'male'),

('patient20@example.com', 'passwordmno5', 'Patient 20', 'Address 483', 'female');

INSERT INTO

MedicalHistory(id,date,conditions,surgeries,medication)

VALUES

- (1, '9-01-14', 'Pain in abdomen', 'Heart Surgery', 'Crocine'),
- (2, '19-01-14', 'Frequent Indigestion', 'none', 'none'),
- (3, '19-01-14', 'Body Pain', 'none', 'Iodex'),
- (4, '14-01-15', 'Cough and Cold', 'none', 'Benadryl'),
- (5, '9-01-15', 'Headache', 'none', 'Aspirin'),
- (6, '15-01-15', 'Fever', 'none', 'Paracetamol'),
- (7, '9-01-16', 'Joint Pain', 'Physiotherapy', 'none'),
- (8, '13-01-16', 'Diabetes', 'Insulin', 'none'),
- (9, '17-01-17', 'Skin Rash', 'none', 'Calamine Lotion'),
- (10, '19-01-17', 'High Blood Pressure', 'Beta Blockers', 'none'),
- (11, '19-01-17', 'Muscle Cramps', 'none', 'Magnesium Tablets'),
- (12, '12-01-18', 'Back Pain', 'Chiropractic Therapy', 'none'),
- (13, '29-01-18', 'Migraine', 'none', 'Sumatriptan'),
- (14, '19-01-18', 'Stomach Ulcer', 'Antacids', 'none'),

(15, '29-01-19', 'Anxiety', 'Counseling', 'none'),
(16, '29-01-19', 'Depression', 'Antidepressants', 'none'),
(17, '9-01-19', 'Insomnia', 'Sleeping Pills', 'none'),
(18, '19-01-20', 'Thyroid Disorder', 'Hormone Replacement
Therapy', 'none'),
(19, '9-01-20', 'Asthma', 'Inhalers', 'none'),
(20, '9-01-20', 'Allergic Rhinitis', 'none', 'Nasal Spray');

INSERT INTO Doctor(email, password, name,gender)

VALUES

('doctor1@example.com', 'password123', 'Dr. Smith', 'male'),
('doctor2@example.com', 'password456', 'Dr. Lee', 'female'),
('doctor3@example.com', 'password789', 'Dr. Patel', 'male'),
('doctor4@example.com', 'password111', 'Dr. Williams', 'female'),
('doctor5@example.com', 'password222', 'Dr. Johnson', 'male'),
('doctor6@example.com', 'password333', 'Dr. Chen', 'female'),
('doctor7@example.com', 'password444', 'Dr. Brown', 'male'),
('doctor8@example.com', 'password555', 'Dr. Gupta', 'male'),
('doctor9@example.com', 'password666', 'Dr. Martinez', 'female'),
('doctor10@example.com', 'password777', 'Dr. Wilson', 'male'),

('doctor11@example.com', 'password888', 'Dr. Kim', 'female'),
('doctor12@example.com', 'password999', 'Dr. Taylor', 'male'),
('doctor13@example.com', 'password000', 'Dr. Singh', 'male'),
('doctor14@example.com', 'password111', 'Dr. Anderson', 'female'),
('doctor15@example.com', 'password222', 'Dr. Baker', 'male'),
('doctor16@example.com', 'password333', 'Dr. Chen', 'female'),
('doctor17@example.com', 'password444', 'Dr. Davis', 'male'),
('doctor18@example.com', 'password555', 'Dr. Gonzalez', 'female'),
('doctor19@example.com', 'password666', 'Dr. Hernandez', 'male'),
('doctor20@example.com', 'password777', 'Dr. Jackson', 'female');

INSERT INTO Appointment(id,date,starttime,endtime)

VALUES

(1, '19-01-15', '09:00', '10:00'),
(2, '19-01-16', '10:00', '11:00'),
(3, '19-01-18', '14:00', '15:00'),
(4, '19-01-19', '16:00', '17:00'),
(5, '19-01-21', '11:00', '12:00'),
(6, '19-01-22', '13:00', '14:00'),
(7, '19-01-23', '15:00', '16:00'),

(8, '19-01-25', '09:00', '10:00'),
(9, '19-01-26', '11:00', '12:00'),
(10, '19-01-28', '14:00', '15:00'),
(11, '19-01-29', '16:00', '17:00'),
(12, '19-01-31', '10:00', '11:00'),
(13, '19-02-01', '12:00', '13:00'),
(14, '19-02-02', '14:00', '15:00'),
(15, '19-02-04', '09:00', '10:00'),
(16, '19-02-05', '11:00', '12:00'),
(17, '19-02-07', '14:00', '15:00'),
(18, '19-02-08', '16:00', '17:00'),
(19, '19-02-10', '10:00', '11:00'),
(20, '19-02-11', '12:00', '13:00');

INSERT INTO

PatientsAttendAppointments(patient,appt,concerns,symptoms)

VALUES

('patient1@example.com', 1, 'none', 'headache'),
('patient2@example.com', 2, 'infection', 'fever'),
('patient3@example.com', 3, 'nausea', 'vomiting'),

('patient4@example.com', 4, 'cold', 'cough'),
('patient5@example.com', 5, 'allergy', 'sneezing'),
('patient6@example.com', 6, 'injury', 'back pain'),
('patient7@example.com', 7, 'none', 'stomach ache'),
('patient8@example.com', 8, 'infection', 'sore throat'),
('patient9@example.com', 9, 'nausea', 'diarrhea'),
('patient10@example.com', 10, 'migraine', 'headache'),
('patient11@example.com', 11, 'cold', 'runny nose'),
('patient12@example.com', 12, 'allergy', 'itchy eyes'),
('patient13@example.com', 13, 'injury', 'knee pain'),
('patient14@example.com', 14, 'none', 'chest pain'),
('patient15@example.com', 15, 'infection', 'earache'),
('patient16@example.com', 16, 'nausea', 'indigestion'),
('patient17@example.com', 17, 'migraine', 'dizziness'),
('patient18@example.com', 18, 'cold', 'sore throat'),
('patient19@example.com', 19, 'allergy', 'hives'),
('patient20@example.com', 20, 'injury', 'sprained ankle');

INSERT INTO Schedule(id,starttime,endtime,breaktime,day)

VALUES

(001,'09:00','17:00','12:00','Monday'),
(001,'09:00','17:00','12:00','Tuesday'),
(001,'09:00','17:00','12:00','Wednesday'),
(001,'09:00','17:00','12:00','Thursday'),
(001,'09:00','17:00','12:00','Friday'),
(002,'09:00','17:00','12:00','Monday'),
(002,'09:00','17:00','12:00','Tuesday'),
(002,'09:00','17:00','12:00','Wednesday'),
(002,'09:00','17:00','12:00','Thursday'),
(002,'09:00','17:00','12:00','Friday'),
(003,'09:00','17:00','12:00','Monday'),
(003,'09:00','17:00','12:00','Tuesday'),
(003,'09:00','17:00','12:00','Wednesday'),
(003,'09:00','17:00','12:00','Thursday'),
(003,'09:00','17:00','12:00','Friday'),
(004,'09:00','17:00','12:00','Monday'),
(004,'09:00','17:00','12:00','Tuesday'),
(004,'09:00','17:00','12:00','Wednesday'),
(004,'09:00','17:00','12:00','Thursday'),
(004,'09:00','17:00','12:00','Friday');

```
INSERT INTO PatientsFillHistory(patient,history)
```

```
VALUES
```

```
('patient1@example.com', 1),
```

```
('patient2@example.com', 2),
```

```
('patient3@example.com', 3),
```

```
('patient4@example.com', 4),
```

```
('patient5@example.com', 5),
```

```
('patient6@example.com', 6),
```

```
('patient7@example.com', 7),
```

```
('patient8@example.com', 8),
```

```
('patient9@example.com', 9),
```

```
('patient10@example.com', 10),
```

```
('patient11@example.com', 11),
```

```
('patient12@example.com', 12),
```

```
('patient13@example.com', 13),
```

```
('patient14@example.com', 14),
```

```
('patient15@example.com', 15),
```

```
('patient16@example.com', 16),
```

```
('patient17@example.com', 17),
```


('patient18@example.com', 18),

('patient19@example.com', 19),

('patient20@example.com', 20);

INSERT INTO Diagnose(appt,doctor,diagnosis,prescription)

VALUES

(1, 'doctor1@example.com', 'Headache', 'Tylenol'),

(2, 'doctor2@example.com', 'Sore throat', 'Salt water gargles'),

(3, 'doctor3@example.com', 'Allergies', 'Claritin'),

(4, 'doctor4@example.com', 'Stomach ache', 'Pepto Bismol'),

(5, 'doctor5@example.com', 'Back pain', 'Heat therapy'),

(6, 'doctor6@example.com', 'Cold', 'Chicken soup'),

(7, 'doctor7@example.com', 'Fever', 'Advil'),

(8, 'doctor8@example.com', 'Joint pain', 'Ibuprofen'),

(9, 'doctor9@example.com', 'Nausea', 'Ginger ale'),

(10, 'doctor10@example.com', 'Anxiety', 'Deep breathing
exercises'),

(11, 'doctor11@example.com', 'Insomnia', 'Melatonin'),

(12, 'doctor12@example.com', 'High blood pressure', 'Exercise and
diet'),

(13, 'doctor13@example.com', 'Depression', 'Counseling'),
(14, 'doctor14@example.com', 'Acne', 'Benzoyl peroxide'),
(15, 'doctor15@example.com', 'Rash', 'Hydrocortisone cream'),
(16, 'doctor16@example.com', 'Migraine', 'Caffeine'),
(17, 'doctor17@example.com', 'Constipation', 'Fiber-rich diet'),
(18, 'doctor18@example.com', 'Diarrhea', 'Imodium'),
(19, 'doctor19@example.com', 'Cough', 'Robitussin'),
(20, 'doctor20@example.com', 'Flu', 'Tamiflu');

INSERT INTO DocsHaveSchedules(sched,doctor)

VALUES

(001, 'doctor1@example.com'),
(002, 'doctor4@example.com'),
(001, 'doctor5@example.com'),
(003, 'doctor6@example.com'),
(004, 'doctor7@example.com'),
(003, 'doctor8@example.com'),
(004, 'doctor9@example.com');

INSERT INTO DoctorViewsHistory(history,doctor)

VALUES

(1, 'doctor12@example.com'),
(2, 'doctor2@example.com'),
(3, 'doctor7@example.com'),
(4, 'doctor4@example.com'),
(5, 'doctor16@example.com'),
(6, 'doctor9@example.com'),
(7, 'doctor1@example.com'),
(8, 'doctor19@example.com'),
(9, 'doctor8@example.com'),
(10, 'doctor20@example.com'),
(11, 'doctor15@example.com'),
(12, 'doctor5@example.com'),
(13, 'doctor6@example.com'),
(14, 'doctor11@example.com'),
(15, 'doctor18@example.com'),
(16, 'doctor14@example.com'),
(17, 'doctor3@example.com'),
(18, 'doctor13@example.com'),
(19, 'doctor17@example.com'),
(20, 'doctor10@example.com');

Normalization

Sr.	Table	1NF	2NF	3NF	BCNF
1	Appointment (<u>id</u> , date , starttime , endtime ,)	YES	YES	YES	YES
2	Diagnose (<u>appt</u> , <u>doctor</u> , diagnosis , prescription)	YES	YES	YES	YES
3	DocsHaveSchedules (<u>sched</u> , <u>doctor</u>)	YES	YES	YES	YES
4	Doctor (<u>email</u> , gender , password , name)	YES	YES	YES	YES
5	DoctorViewsHistory (<u>history</u> , <u>doctor</u>)	YES	YES	YES	YES
6	medicalHistory (<u>id</u> ,date ,conditions , surgeries , medication)	YES	YES	YES	YES
7	patient (<u>Email</u> ,Password ,Name ,Address ,Gender)	YES	YES	YES	YES
8	patientsattendappointments (<u>patient</u> , <u>appt</u> , concerns , symptoms,)	YES	YES	YES	YES

9	patientsfillhistory (patient , <u>history</u>)	YES	YES	YES	YES
10	schedule (<u>id</u> , <u>starttime</u> , <u>endtime</u> , <u>breaktime</u> , <u>day</u>)	YES	YES	YES	YES

Queries & Functionality

- ❖ Query to get schedule of x doctor on y day
 - `SELECT * FROM SCHEDULE WHERE DAY = 'Tuesday'`
`AND id IN (`
`SELECT appt FROM Diagnose WHERE doctor =`
`'doctor1@example.com');`
- ❖ Get medical history from patient id
 - `SELECT * FROM MedicalHistory`
`INNER JOIN PatientsFillHistory ON MedicalHistory.id =`
`PatientsFillHistory.history`
`INNER JOIN Patient ON PatientsFillHistory.patient =`
`Patient.email`
`WHERE Patient.email = 'patient1@example.com';`
- ❖ Get doctor detail from email
 - `SELECT * FROM Doctor WHERE email =`
`'doctor1@example.com';`
- ❖ get patient detail from email
 - `SELECT * FROM Patient WHERE email =`
`'patient1@example.com';`
- ❖ Get Whole schedule of doctor by email
 - `SELECT * FROM Schedule`
`INNER JOIN DocsHaveSchedules ON Schedule.id =`
`DocsHaveSchedules.sched`

```
INNER JOIN Doctor ON DocsHaveSchedules.doctor =  
Doctor.email
```

```
WHERE Doctor.email = 'doctor1@example.com';
```

❖ Get medical history treated by doctor email

➤

```
SELECT * FROM MedicalHistory
```

```
INNER JOIN Diagnose ON MedicalHistory.id = Diagnose.appt
```

```
INNER JOIN Doctor ON Diagnose.doctor = Doctor.email
```

```
WHERE Doctor.email = 'doctor2@example.com';
```

❖ Get all patient list by Doctor name

➤

```
SELECT Patient.name FROM Patient
```

```
INNER JOIN PatientsAttendAppointments ON Patient.email =
```

```
PatientsAttendAppointments.patient
```

```
INNER JOIN Diagnose ON PatientsAttendAppointments.appt =
```

```
Diagnose.appt
```

```
INNER JOIN Doctor ON Diagnose.doctor = Doctor.email
```

```
WHERE Doctor.name = 'Dr. Smith';
```

❖ doctor name by its prescription

➤

```
SELECT Doctor.name, Doctor.email FROM Doctor
```

```
INNER JOIN Diagnose ON Doctor.email = Diagnose.doctor
```

```
WHERE Diagnose.prescription = 'Exercise and diet';
```

❖ Patient name group by medicines

```
➤ SELECT medication, GROUP_CONCAT(name  
  SEPARATOR ', ') as patients  
  FROM MedicalHistory  
  INNER JOIN PatientsFillHistory ON MedicalHistory.id =  
  PatientsFillHistory.history  
  INNER JOIN Patient ON PatientsFillHistory.patient =  
  Patient.email  
  GROUP BY medication;
```

❖ patientsname group by symptoms

```
➤ SELECT symptoms, GROUP_CONCAT(name SEPARATOR  
  ', ') as patients  
  FROM PatientsAttendAppointments  
  INNER JOIN Patient ON  
  PatientsAttendAppointments.patient = Patient.email  
  GROUP BY symptoms;
```


Conclusion & future work:

Each time we have learnt something new, we have gone through many corrections after which we arrived at the above database model. Though, we do not claim that it is the optimum model as per as the practical use is concerned but we do conclude that after certain modifications it can match the standards of the present similar working database model which does require more exposure to this subject and a good experience of the practically working database models which we can analyze.