

## **DBMS Final Project Report:**

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This application is deployed on port number : 8699

### **Description:**

We are developing an American hospitals information and management system. It contains all the information about the hospitals in a city like its departments, doctors, patients etc. Also, contains information about the patients like the patient details, their medical records, their medical bills, information about the drugs prescribed, the appointments taken. The database is not only hospital specific but also patients specific like we will be able to find out the number of appointments a particular patient has made in different hospitals and also has the history of all his reports, it is hospital specific because it not made for 1 specific hospital but for all the hospitals in the country. Overall, there is a lot of data.

### **Business rules:**

- Every hospital should have 1 or more staff working in a department.
- Every hospital should have 1 or more Doctor working in a department.
- Each doctor works in exactly 1 hospital and in 1 department in it.
- Each staff works in exactly 1 hospital and in 1 department in it.
- Every appointment involves exactly one patient, exactly one doctor and has exactly one report.
- Patients can be diagnosed by one or more doctors.
- An ambulance must belong to exactly 1 hospital.
- Each payment is linked with exactly 1 hospital and exactly 1 patient.

### **Entity Sets and their Attributes**

#### **Hospital:**

hid: a unique id for a hospital  
name: name of the hospital  
street: street in which the hospital is located

city: city in which the hospital is located  
state: state in which the hospital is located  
zip: zip code of the hospital.  
rating: each hospital has a rating in the range of 0-5  
hospital\_license: The license number given by the government.

#### Departments:

dep\_id: A unique id for each department.  
dname: Name of the department.

#### Doctors:

doc\_id: A unique id for every doctor in a hospital  
name: name of the doctor  
gender: gender of the doctor  
dob: date of birth of the doctor.  
degree: The highest degree received by the doctor.  
success\_rate: each doctor has a success rate  
experience : No of years experience the doctor has.  
hid: Hospital Id which is not null ( foreign key reference) ( key & participation constraints)  
dep\_id: Department Id which is not null ( foreign key reference) ( key & participation constraints)

#### Staff:

sid: A unique id number for each of the staff.  
name: name of the staff  
dob: date of birth of the staff member.  
experience : Number of years in experience.  
salary: total salary in dollars.  
dep\_id: Department Id which is not null( foreign key reference) ( key & participation constraints)  
hid: Hospital Id which is not null ( foreign key reference) ( key & participation constraints)

#### Ambulance:

aid: a unique id for each ambulances  
vehicle\_no: the license plate number of the ambulance  
vehicle\_type: ambulances are of two types, one with all the equipment installed necessary for surgery and general.

hid: Hospital Id which is not null ( foreign key reference) ( key & participation constraints)

#### Medicines:

med\_id: unique id for each medicine  
medicine\_name: name of the medicine  
price\_per\_unit: the cost of medicine per unit.

#### Reports:

r\_id: unique id for each report produced.  
summary: the summary of the report

#### Reports has medicines:

r\_id: unique id for each report produced( foreign key reference)  
med\_id: unique id of a medicine( foreign key reference)

#### Patients:

pid: unique id for patients.  
p\_name: name of the patients  
gender : gender of the patient and it contains two values :M,F  
state: state where the patient resides  
dob: date of birth of the patient  
insurance: It is a bool value and has 1 if the patient is insured, else 0.

#### Appointments :

app\_id: unique id for appointments.  
appt\_date: the date in which the appointment is set.  
rid: Report id.(foreign key reference)  
(key & participation constraints)  
pid:Patient id(foreign key reference) (participation constraint)  
doc\_id: Doctor Id (foreign key reference) (participation constraint)

#### Payments:

tid: a unique id that identifies every transaction  
hid: a unique id that identifies each hospital( foreign key reference) ( key & participation constraints)

pid: a unique id that has information about the patients( foreign key reference) ( key & participation constraints)

amount: the cost of health care

date: the date in which the transaction happened.

### Schema:

```
DROP TABLE IF EXISTS Hospital;  
DROP TABLE IF EXISTS Departments;  
DROP TABLE IF EXISTS Doctors;  
DROP TABLE IF EXISTS Staff;  
DROP TABLE IF EXISTS Ambulance;  
DROP TABLE IF EXISTS Medicines;  
DROP TABLE IF EXISTS Patients;  
DROP TABLE IF EXISTS Payments;  
DROP TABLE IF EXISTS Reports;  
DROP TABLE IF EXISTS Reports_has_Medicines;  
DROP TABLE IF EXISTS Appointments;
```

```
CREATE TABLE Hospital(  
  hid integer primary key,  
  name varchar(128) not null,  
  street varchar(128) not null,  
  city varchar(128) not null,  
  state varchar(2) not null,  
  zip integer not null,  
  rating integer,  
  check (rating in (0,1,2,3,4,5)),  
  hospital_license integer not null unique  
);
```

```
CREATE TABLE Departments(  
  dep_id integer primary key,  
  dname varchar(64) not null  
);
```

```
CREATE TABLE Doctors(  
  doc_id integer primary key,  
  name varchar(128) not null,  
  gender char(1) ,  
  check (gender in ('M', 'F')),  
  dob date,  
  degree varchar(64) ,  
  success_rate integer ,  
  experience integer ,  
  hid integer not null,  
  dep_id integer not null,  
  foreign key (hid) references Hospital(hid),  
  foreign key (dep_id) references Departments(dep_id)  
);
```

```
CREATE TABLE Staff(  
  sid integer primary key,  
  name varchar(128) not null,  
  dob date ,  
  experience integer,  
  salary integer,  
  dep_id integer not null,  
  hid integer not null,  
  foreign key (hid) references Hospital(hid),  
  foreign key (dep_id) references Departments(dep_id)  
);
```

```
CREATE TABLE Ambulance(  
  aid integer primary key,  
  vehicle_no varchar(10),  
  vehicle_type varchar(128),  
  hid integer not null,  
  foreign key (hid) references Hospital(hid)
```

);

```
CREATE TABLE Medicines(  
  med_id integer primary key,  
  medicine_name varchar(128) not null,  
  price_per_unit decimal  
);
```

```
CREATE TABLE Reports(  
  rid integer primary key,  
  summary varchar(128)  
);
```

```
CREATE TABLE Reports_has_Medicines(  
  rid integer ,  
  med_id integer,  
  primary key(rid,med_id),  
  foreign key (med_id) references Medicines(med_id),  
  foreign key (rid) references Reports(rid)  
);
```

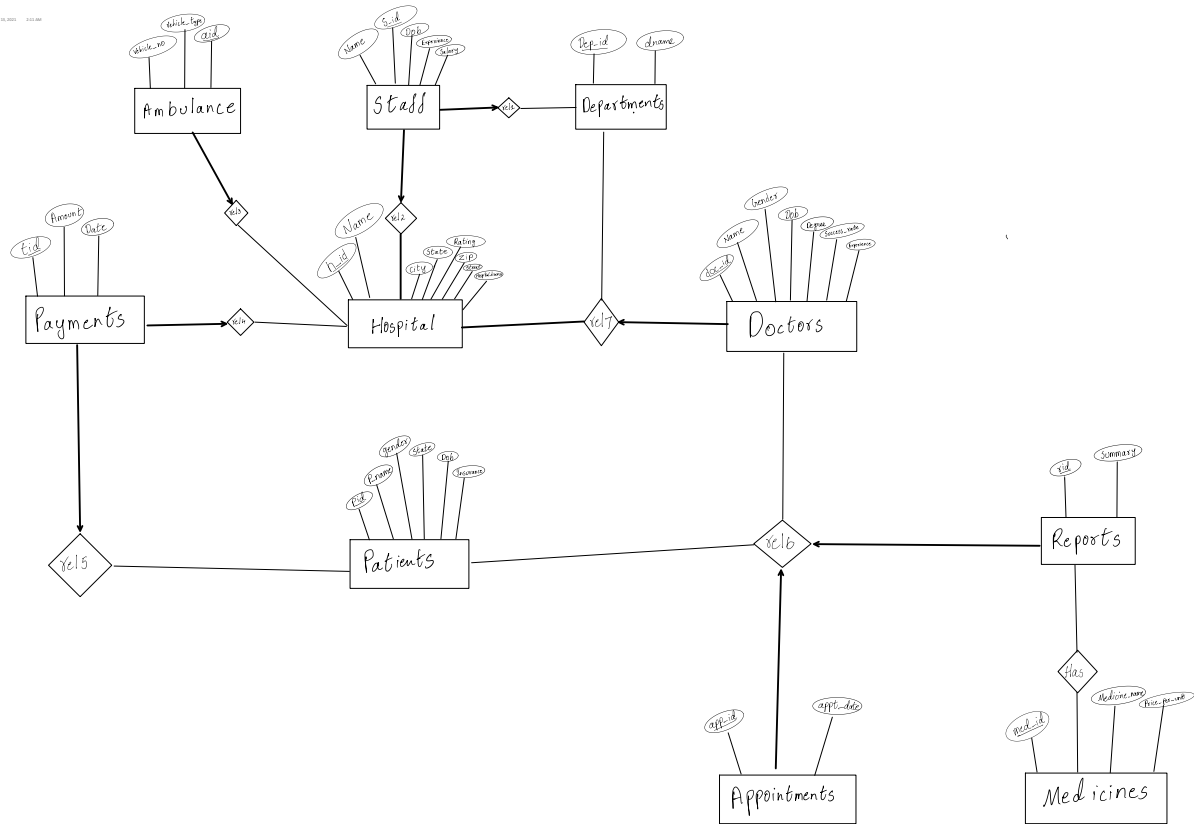
```
CREATE TABLE Patients(  
  pid integer primary key,  
  p_name varchar(128) not null,  
  gender char(1) ,  
  check (gender in ('M', 'F')),  
  state varchar(2) not null,  
  dob date,  
  insurance bool not null  
);
```

```
CREATE TABLE Appointments(  
  app_id integer primary key,  
  appt_date date not null,  
  rid integer unique not null,  
  pid integer not null,  
  doc_id integer not null,  
  foreign key (rid) references Reports(rid),
```

```
foreign key (pid) references Patients(pid),  
foreign key (doc_id) references Doctors(doc_id)  
);
```

```
CREATE TABLE Payments(  
tid integer,  
hid integer ,  
pid integer,  
amount integer not null,  
date date not null,  
primary key(tid,pid,hid),  
foreign key (pid) references Patients(pid),  
foreign key (hid) references Hospital(hid)  
);
```

ER diagram:



### Data:

Some of the data we used in the project is the data we created for the purpose of the project. Some of the data like the names of doctors , patients name, department name, the whole hospital data, their addresses, the names of the medicines and their costs are extracted from the internet from various sources . Other Attributes like the date of birth, degree, success rate are generated at random, using python scripts. Attributes like experience are written in python, experience is generally current age – 24years. Attributes like h\_id(hospital id), p\_id(patient id) and other attributes which are the Primary keys of tables are given in a sequential order starting from 1.

### Queries:



1) Hospitals in a particular state which have rating >4 and having doctors from a specific department.

Use case: For the above query, the state of the hospital and the department of the doctor will be the user inputs, rating>4 will be fixed in the query. This query can be useful when people search for doctors in their surroundings or their neighbourhood, usually people tend to be inclined more over the highly rated hospitals thus the rating >4.

This query will return the names of the doctors from the specified department from a hospital located in a particular state with rating > 4.

2) Count of number of Hospitals in a state which do not have ambulance facility in that particular state.

Use case: State is the only input in this query, This query be helpful for government officials, they understand which hospitals do not have any ambulances run by them. So that they can understand which hospitals to increase funding.

3) Appointments made in specific departments during different years.

Use case: In this query there is no user input, we run the query in postgresql and present you with the outcome, which contains the names of all the 20 department names and the appointments made in those departments in 2 years.

4) Medicines received by a patient during a particular appointment date and their cost.

Use case: In this query, the input is the patients name and the appointment date. Appointment dates are changed when a patient name is changed. The output of the query is the cost of medicines the patient paid at that particular appointment. This query might be useful for the doctors when they find answers to questions like what were the patients prescribed and how much money they paid in the last visit,

5) Doctors with a MBBS degree working in a particular department and having a minimum year of experience.

Use case: Department name and the minimum years of experience will be the inputs for this query. This kind of query can be helpful for all genders patients while searching for doctors as they can specify the gender of the doctor, also the experience of the doctor can be selected.

6 Hospitals from a particular state and their revenue from the years 2020, 2021

Use case: The input for this query will be the name of the state. This query can be useful for government officials to check if the hospitals are stable and are afloat.

7 Hospital's and their patient's conditions in a state.

Use Case : State is taken as an user input. We'll display the hospitals and the number of patients in that hospital with their conditions like "Immediate Care required " , "Shift to ICU" etc.,