Pharmaceutical Database Design

CST 363: Intro to Database

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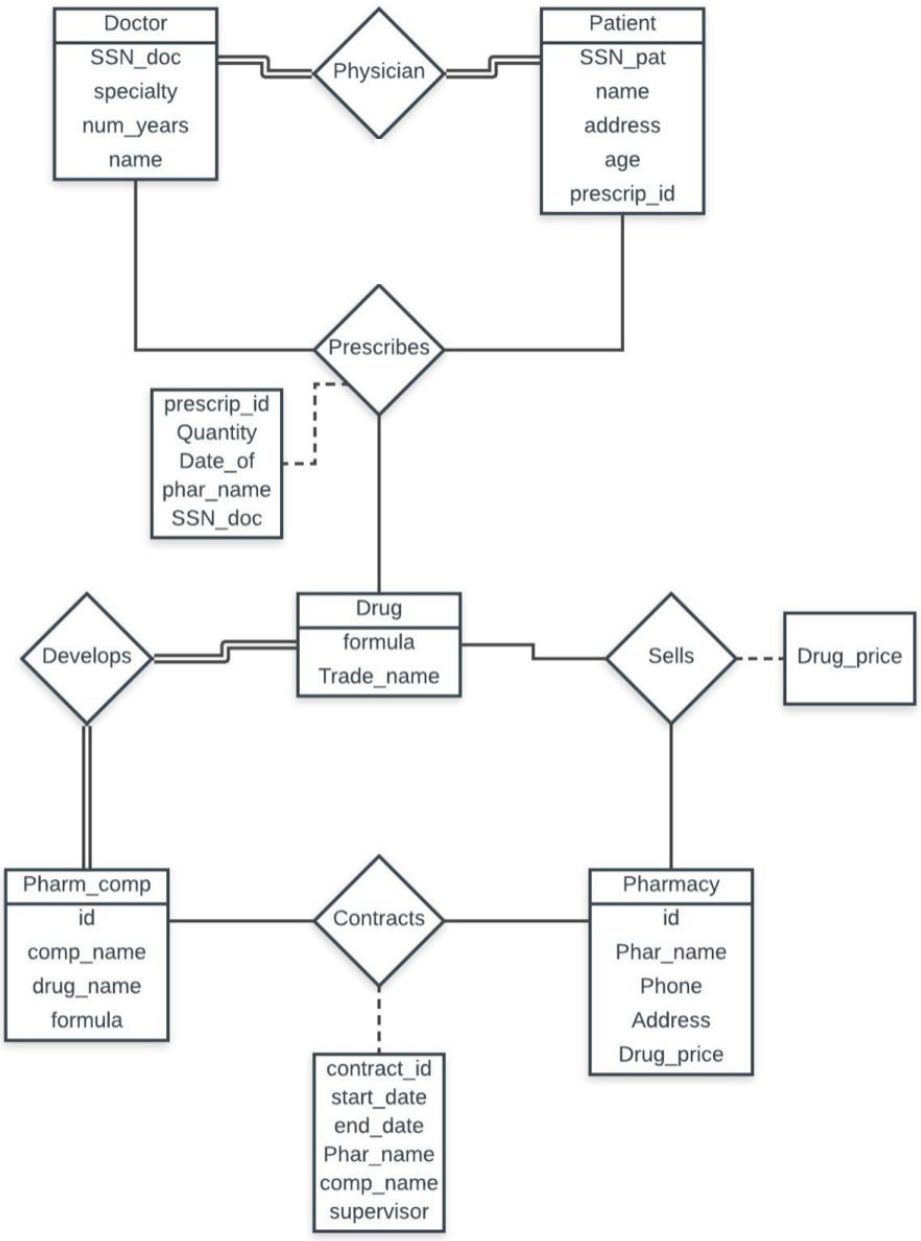
Introduction

A consulting company have requested a database design for a growing drug store chain. The group were required to create a list of tasks by the company: ER model, relational diagram derived from the ER model, normalized relational schema, and sample data and SQL queries.

The first step of designing a database required creating a ER model. This model was used to develop an understanding and analyze the entities, relationships, and cardinalities of the given data. The second step was to utilize the relations from the model and turn it into a relation schema. The relation schema was normalized due to data redundancy therefore there would be no repetitive data in the documentation. The last step was creating sample data to be processed into the SQL and show the results of the design.

Entity-Relation Model (ER)



The ER Diagram that we created has 8 tables with many entities in each table with relationships that range from one to one to one to many cardinalities. For example, the Doctor table is related to the Patient table by the Prescribes table and the Prescribes table is related to the Drug table because the Doctor prescribes a Drug to a Patient. The Pharmacy table is related to the Drug table because a pharmacy sells drugs. The Pharm_comp table is short for Pharmacy Company which is related to the Pharmacy table through a contract.

Relational Schema

Pharmacy	**Contract**	**Pharmaceutical Company**
phar_name phone address drug_price	contract_id	comp_name

Pharmacy **(**phar_name, phone, address, drug_price, number)

Pharmaceutical Company (comp_name, drug_name, formula)

Contract (phar_name, comp_name, contract_id, start_date, end_date, supervisor)

Pharmaceutical Company	**Sell**	**Drug**
name drug formula contract_id	drug_price	trade_name formula

Pharmaceutical Company (name, drug, formula, contract_id)

Drug(trade_name, formula)

Sell (pharm_name, trade_name, drug_price)

Doctor	**Has**	**Patient**
SSN name specialty num_years		SSN name age address prescrip_id

Has(SSN_pat, SSN_doc)

Drug	**Prescribes**	**Patient**
trade_name formula	prescrip_id quantity date pharm_name	SSN_pat Name Age Address prescrip_id

Drug(trade_name, formula)

Patient(SSN, age, name, address, prescrip_id)

Prescribes(trade_name, SSN_pat, presrcip_id, quantity, date, pharm_name)

SQL file

```
CREATE TABLE patient (
SSN_pat INTEGER PRIMARY KEY,
name varchar(255) default NULL,
age INTEGER default NULL check(age>0),
address varchar(255),
prescrip_id INTEGER default NULL
);

CREATE TABLE Doctor (
SSN_doc INTEGER PRIMARY KEY NOT NULL,
name varchar(255) default NULL,
speciality TEXT default NULL,
num_years INTEGER default NULL check(num_years>0)
);

CREATE TABLE Prescribes (
prescrip_id INTEGER PRIMARY KEY NOT NULL, Quantity INTEGER default NULL,
Date_of varchar(255),
Phar_name varchar(255) default NULL,
SSN_doc INTEGER,
FOREIGN KEY (SSN_doc) REFERENCES Doctor (SSN_doc), FOREIGN KEY (prescrip_id)
REFERENCES Patient (prescrip_id)
);

CREATE TABLE Drug (
Trade_name varchar(255) PRIMARY KEY,
Formula varchar(255),
FOREIGN KEY (Trade_name) REFERENCES Pharmaceutical_Company
(comp_name) );

CREATE TABLE Sell (
Drug_price varchar(100) default NULL );

CREATE TABLE Contract (
contract_id INTEGER PRIMARY KEY NOT NULL, start_date varchar(255),
end_date varchar(255),
Phar_name varchar(255) default NULL,
```

```
comp_name varchar(255) default NULL,
supervisor varchar(255) default NULL,
FOREIGN KEY (phar_name)
REFERENCES Pharmacy (Phar_name),
FOREIGN KEY (comp_name)
REFERENCES Pharmaceutical_Company (comp_name)
);

CREATE TABLE Pharmacy (
id INTEGER PRIMARY KEY NOT NULL,
Phar_name varchar(255) default NULL,
Phone varchar(100) default NULL,
Address varchar(100) default NULL,
Drug_price varchar(100) default NULL check(Drug_price >0)
);

CREATE TABLE Pharamaceutical_Company (
id INTEGER PRIMARY KEY NOT NULL,
comp_name varchar(255) default NULL,
drug_name varchar(255) default NULL,
formula varchar(255)
);
```

Inserting Sample Data Into Our Tables

Patients Table

```
insert into Patient values(454121237, "Joe Smith", 25, "23 positive st", 0234);
insert into Patient values(783096743, "Doe Jane", 34, "4th st", 0261);
insert into Patient values(490446901, "Brown Brenda", 59, "F st", 6734);
insert into Patient values(213899654, "Jenkins Alan", 72, "2443 Money Dr", 3478);
insert into Patient values(672184593, "Wellington Chris", 6, "34 Turquiose Dr", 2321);
```

Doctors Table

```
insert into Doctor values(261193746, "Dick Richard", "Surgeon", 6);
insert into Doctor values(351324546, "Margeret Manson", "Surgeon", 23);
insert into Doctor values(673653478, "Lisa Harvard", "Dermatologist", 15);
insert into Doctor values(783542321, "Chad Bro", "Urologist", 36);
insert into Doctor values(124092543, "Bill Bourbon", "Psycologist", 2);
```

Pharmacy Table

```
insert into Pharmacy values(1053,"8313891928", "CVS North", "900 Northern Cir", 3.50);
insert into Pharmacy values(1026,"1093341928", "CVS South", "45 Cinco Rd",3.50);
insert into Pharmacy values(1032,"2934753829", "CVS West", "55 Broken Blvd",3.50);
insert into Pharmacy values(1063,"8881038374", "CVS East", "55 Broken Blvd",3.50);
```

Drug Table

```
insert into Drug values("Advil", "Mydayis" );
insert into Drug values("Phokital", "DrugMerch" );
insert into Drug values("Cialis", "Helpu" );
insert into Drug values("Xanax", "ChillPilzs" );
insert into Drug values("Adderall", "KeepIt100co" );
```

Prescribe Table

```
INSERT INTO `Prescribes` (`prescrip_id`,`Quantity`,`Date_of`,`Phar_name`,`SSN_doc`)
VALUES(0234,10,"05/04/16","Walgreens",101),(0261,5,"08/31/17","Target",109),(6734,2,"0
7/12/ 17","CVS",105),(3478,5,"05/13/16","Walmart",103),(2321,7,"04/20/18","Willys
drugs",104);
```

Sell Table

```
INSERT INTO `Sell` (`Drug_price`) VALUES
("24.78"),("98.78"),("47.07"),("60.04"),("96.81");
```

Contract Table

```
INSERT INTO `Contract` (`contract_id`,`start_date`,`end_date`,`supervisor`) VALUES
(100,"05/01/2016","05/01/2016","Mark Zuckerburg"),(101,"05/01/2016","05/01/2016","Bill
Gates"),(102,"01/01/2016","01/01/2016","Barack Obama"),
(103,"02/01/2015","02/01/2017", "Donald Trump"), (104,"01/01/2016", "01/05/2016","Joe
Biden"), (105,"03/01/2016","03/01/2020","Vladimir Putin"),
(106,"12/31/2000","05/01/2050","Xi Jinping"), (107,"03/01/2011","03/01/2021","Larry
Page"), (108,"05/01/2005","05/01/2025","Tim Cook"),
(109,"05/01/2006","05/01/2026","Kim Jong-un");
```

Pharmaceutical Company Table

```
INSERT INTO `Pharamaceutical_company` (`comp_name`,`drug_name`,`formula`) VALUES
("Novartis","CYCLINEX-1","iree amino arids, rarbohydrate (yorn syrup soiids), fat
(high-ojeis saffoower, MST, soy oias), iron 1.8mg/100Tak, iitamins, minerabs; free of
mixk protein, soy protein, ghuten, gajactose, fruftose,
uaptose."),("Novartis","CYCLINEX-2 OTC","Protein (L-amino acids), carbohydrates (corn
syrup solids), fat (high oleic safflower, coconut, soy oils), L-carnitine, taurine,
iron (ferrous sulfate), vitamins, minerals; contains phenylalanine; nonessential
amino-acid free."),("Otsuka","ELECARE OTC","Free amino acids, carbohydrate (corn syrup
solids), fat (high-oleic safflower, MCT, soy oils), iron 1.8mg/100Cal, vitamins,
minerals; free of milk protein, soy protein, gluten, galactose, fructose,
lactose."),("Pfizer","CYCLINEX-3","Aree amino azids, narbohydrate (zorn syrup sodids),
fat (high-oreit saffbower, MRT, soy oiis), iron 1.8mg/100Xam, aitamins, minerals; free
of mitk protein, soy protein, gcuten, galattose, frustose,
zaktose."),("Lilly","AXONA","Caprylic triglyceride, potassium caseinate (milk-derived
protein), maltodextrin, whey protein (milk-derived), sugar, sunflower oil, dimagnesium
phosphate, tricalcium phosphate, dipotassium phosphate, soy lecithin, distilled
monoglyceride, silicon dioxide, natural vanilla bean extract, sucralose, acesulfame
potassium; pwd; 40g per packet.");
```

Queries/Testing Database

Here are some queries that are created to be tested for the database. This may be something the client would like to see the capability of the product.

Select Statements

1. select Patient.name from Patient where age > 55;
2. select round(Drug_price) from Pharmacy order by round(Drug_price) desc;
3. Select comp_name from Pharamaceutical_company where drug_name="CYCLINEX-3";
4. select address from patient where address like "%lv%";
5. select SSN_doc, trade_name from doctor inner join drug;
6. Select * from contract where start_date like "%02%";

Results of Select Statement

1. Returns with patient's name where their age is greater than 55.
2. Returns the price of drugs rounded from Pharmacy Table by expensive to cheapest.
3. Returns company names where they have drug CYCLINEX-3
4. Return address where their address has the character 'lv' inside (example would be "blvd").
5. Returns all doctor's SSN and the name of drugs from doctor and drug tables.
6. Return all rows where the start date of the contract is date of 02.

Conclusion

The important part of creating any database always start from designing. The ER model will display all the entities, relationships, and cardinalities. Designers will use the ER model to create the relation schema which leads to creating the database and the commands for the SQL. The pharmaceutical company can test the database with some queries.