Mark Strong-Shinozaki
Cpts 451 – Intro Database Systems
Homework #2 – ER to Relational Translation

Question 1 – Convert the ER diagram to relations and write SQL DDL statements for creating the tables for those relations. Pick suitable data types for each attribute. For string attributes pick reasonable lengths. Include the appropriate constraints (domain, primary key, foreign key, UNIQUE, and NULL constraints) in your SQL DDL statements.

-Task-

1. Identify the entities and relationships

2. Convert entities into tables

3. Convert relationships into tables if necessary

Entities & Their Attributes

1. Patient
    a. SNN (Primary Key)
    b. Name
    c. Age
    d. Address
2. Doctor
    a. phySSN (Primary Key)
    b. Name
    c. Specialty
    d. Experience
3. Prescription
    a. Pres# (Primary Key)
    b. Date
    c. Given_in (Foreign key referencing Clinic)
    d. Patient SSN (Foreign key referencing Patient)
    e. Doctor phySSN (Foreign Key referencing Doctor)
4. Clinic
    a. Clinic_name (Primary Key)
    b. City
5. Pharmacy
    a. Phone_num (Primary Key)
    b. Name
6. Drug
    a. Drug_name (Primary Key)
    b. Formula
7. DrugCompany
    a. Name (Primary Key)
    b. Address
    c. Phone_num

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Relationships & Their Attributes

1. Prescribes
   a. Part of Prescription table
2. Pri_physician
   a. Add Doctor phySSN as a foreign key in the Patient table.
3. Sell
   a. Pharmacy phone_num (Foreign Key referencing Pharmacy)
   b. Drug drug_name (Foreign Key referencing Drug)
   c. Price
4. Make
   a. Add DrugCompany as a foreign key in Drug table
5. Contract
   a. DrugCompany Name (Foreign Key referencing DrugCompany)
   b. Supervisor
   c. Text
   d. Start_date
   e. End_date

Written in VScode/pasted here

```
CREATE TABLE Patient (
  SSN CHAR(9) PRIMARY KEY,
  Name VARCHAR(100),
  Age INT,
  Address VARCHAR(200),
  phySSN CHAR(9),
  FOREIGN KEY (phySSN) REFERENCES Doctor(phySSN)
);
CREATE TABLE Doctor (
  phySSN CHAR(9) PRIMARY KEY,
  Name VARCHAR(100),
  Specialty VARCHAR(100),
  Experience INT
);
```

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```
CREATE TABLE Clinic (
   Clinic_name VARCHAR(100) PRIMARY KEY,
   City VARCHAR(100)
);
CREATE TABLE Prescription (
   pres# INT PRIMARY KEY,
   Date DATE,
   Given_in VARCHAR(100),
   SSN CHAR(9),
   phySSN CHAR(9),
   FOREIGN KEY (Given_in) REFERENCES Clinic(Clinic_name),
   FOREIGN KEY (SSN) REFERENCES Patient(SSN),
   FOREIGN KEY (phySSN) REFERENCES Doctor(phySSN)
);
CREATE TABLE Pharmacy (
   phone_num CHAR(10) PRIMARY KEY,
   Name VARCHAR(100)
);
CREATE TABLE Drug (
   drug_name VARCHAR(100) PRIMARY KEY,
   Formula VARCHAR(100),
   CompanyName VARCHAR(100),
   FOREIGN KEY (CompanyName) REFERENCES DrugCompany(Name)
);


CREATE TABLE DrugCompany (
   Name VARCHAR(100) PRIMARY KEY,
   Address VARCHAR(200),
   phone_num CHAR(10)

);

CREATE TABLE Sell (

   phone_num CHAR(10),

   drug_name VARCHAR(100),

   Price DECIMAL(10, 2),

   PRIMARY KEY (phone_num, drug_name),

   FOREIGN KEY (phone_num) REFERENCES Pharmacy(phone_num),

   FOREIGN KEY (drug_name) REFERENCES Drug(drug_name)

);

CREATE TABLE Contract (

   CompanyName VARCHAR(100),

   Supervisor VARCHAR(100),

   Text VARCHAR(1000),

   Start_date DATE,

   End_date DATE,

   FOREIGN KEY (CompanyName) REFERENCES DrugCompany(Name)

);
```

a) For the operations given below, indicate whether execution of the operation would violate some “primary key” or “integrity constraints”. If your answer is yes, specify the constraints (from the above list) that would be violated

i. Insert tuple (a1,b10, d20, 35) into R3

- Foreign Key Constraints
    - R3(MN) references R1(AB): Ensure (a1,b10) exists in R1
    - R3(O) references R2(D): Ensure d20 exists in R2
- Results
    - Yes, it will violate the foreign key constraints if (a1, b10) does not exist in R1 or d20 does not exist in R2

ii. Insert tuple (s500, d20, 75) into R4

- Primary Key Constraint: Ensure no duplicate (s500, d20) in R4
- Foreign Key Constraints:
    - R4(J) references R5(S): Ensure s500 exists in R5
    - R4(K) references R2(D): Ensure d20 exists in R2
- Result:
    - Yes, it will violate the foreign key constraint if s500 does not exist in R5 or d20 does not exist in R2

b) For the operations below, indicate whether execution of the operation would violate any “foreign key constraints”. If your answer is yes, specify the constraints that would be violated. Apply “CASCADE” policy for delete operations, and apply “SET NULL” policy for update operations. Update the tables after applying those policies. (You may either redraw the tables or mention while tuples/attributes are deleted/ updated at each table. For updates rewrite the updated tuples)

i. Delete tuple (d30, 150, 300) from R2.

- Foreign Key Constraints:
    - R3(O) references R2(D): Check for d30 in R3
    - R4(K) references R2(D): Check for d30 in R4
- Result:
    - Yes, it will violate the foreign key constraint as R3 and R4 reference R2(D)
    - CASCADE Policy: Deleting d30 in R2 will delete corresponding tuples in R3 and set NULL in R4

ii. Update tuple (s400, 30, 555) in R5 with values (6000, 60, 66)

- Foreign Key Constraints:
    - R1(C) references R5(S): Check for s400 in R1
    - R4(J) references R5(S): Check for s400 in R4
- Result:
    - Yes, it will violate the foreign key constraint as R1 and R4 reference R5(S)
    - SET NULL: Update will set related foreign key fields to NULL in referencing tables

iii. Update tuple (s100, 20, 555) in R5 with values (6000, 60, 666)

- Foreign Key Constraints:
    - R1(C) references R5(S): Check for s100 in R1
    - R4(J) references R5(S): Check for s100 in R4
- Result:
    - Yes, it will violate the foreign key constraints as R1 and R4 reference R5(S)

  - SET NULL: Update will set related foreign key fields to NULL in referencing tables

c) If all tuples in R5 are deleted, what tuples will R2 and R3 contain?

- If all tuples in R5 are deleted:
- Foreign Key Constraints:
  - R1(C) references R5(S)
  - R4(J) references R5(S)
- Results:
  - R1 and R4 will have NULL values in columns referencing R5.

R2 (after deleting all tuples in R5)

D	E	F
d10	50	100
d20	125	200
d30	150	300
d40	75	400
d50	100	200

R3 (after deleting all tuples in R5)

M	N	O	P
a1	b10	d10	25
a1	b10	d20	5
a2	b10	d20	20
a2	b20	d20	15
a3	b10	d40	15
a4	b20	d40	5
a4	b20	d50	10