Normalization questions

1. Find the canonical cover:

B🡪E

C🡪F

E🡪D

DF🡪A

The original keys: B, C

R1(B, E)

R2(C, F)

R3(E, D)

R4(D, F, A)

R5(B, C) – add the original key

R1, R2, R3, R4, and R5 are in 3NF and in BCNF.

2. Find the canonical cover:

A🡪B

B🡪D

B🡪C

The original key: A

Using B🡪D to decompose R, we get:

R1(A,B,C) in 1NF

R2(B,D) is already in BCNF

Using B🡪C to decompose R1, we get:

R11(A,B) in BCNF

R12(B,C) is already in BCNF

Group the relations with the same key:

R1(B,C,D)

R2(A,B)

R1, R2 are in BCNF form.

3.

R(patient\_id, dob, name, ssn, prescription\_id, prescription\_date, doctor\_id, medication\_price, address, city, state, phone\_no, pharmacy\_address)

R1 includes FD1, FD2

R2 includes FD3

R3 includes FD4

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Patient\_id | dob | name | ssn | prescription\_id | prescription\_date | doctor\_id | medication\_price | address | city | state | phone\_no | pharmacy\_address |
| R1 | K | K | K | K | K | K | K | K | U 🡪K | U  🡪K | U 🡪K | U  🡪K | U  🡪K |
| R2 | U | U | U | U | U | U | K | U | K | K | K | K | U |
| R3 | K | U  🡪K | U  🡪K | U  🡪K | K | U  🡪K | U  🡪K | U  🡪K | U | U | U | U | K |

We have a row with all known values, so the decomposition is lossless. All the FDs have been reserved. So the decomposition is good.

ER questions

1. Assumptions:

1. Doctors with a license can prescribe medications. If you don’t have a license, are you a doctor?

2. pharmacy\_licenseID is used more often than pharmacy name.

3. Medication barcodeNumber is used more often than medication name.

4. PCM\_registrationID is used more often than pharmaceutical company name.

4. Medication must have a formula.

5. Patient must have a date of birth.

diagrammatic E-R: see the E-R pdf file

Textual E-R:

Entities

1. Patient: , Name(FirstName, LastName), DoB(year, month, date), address, PCP\_licenseNumber, PCP\_licenseState;

2. Doctor: licenseNumber, licenseState, Name(FirstName, LastName), specialty, yearOfExperience;

3. Pharmaceutical: PCM\_registrationID, : , phone;

4. Medication: kind(generics,brandName), barcodeNumber, : , formula, pharmaceutical\_manufacturer\_PCM\_registrationID ;

5. Pharmacy: : , pharmacy\_license\_ID, address;

6. Prescription Record: dosage, doctor, patient;

Relationships:

1. has: <Patient, Doctor> M:1, PARTIAL/PARTIAL;

2. prescribe: <Medication, Doctor> (0:5):M, PARTIAL/PARTIAL;

3. manufacture: <Pharmaceutical, Medication> M:N, PARTIAL/PARTIAL;

4. fulfill: <Medication, Pharmacy> M:1, PARTIAL/PARTIAL;

5. record: <Medication, Prescription Record> 1:1, PARTIAL/TOTAL;

2. DOCTOR(licenseNumber, licenseState, FirstName, LastName, specialty, yearOfExperience, has, prescribe, dosage, refill)

PK (licenseNumber, has)

FK (prescribe) 🡪 MEDICATION (prescribe)

PATIENT(SSN, FirstName, LastName, DateOfBirth, address, PCP\_licenseNumber, PCP\_licenseState, has)

PK (FirstName, LastName, DateOfBirth)

FK(PCP\_licenseNumber) 🡪 DOCTOR(licenseNumber)

FK(PCP\_licenseState) 🡪 DOCTOR(licenseState)

FK (has) 🡪 DOCTOR(has)

PHARMACEUTICAL(PCM\_registrationID, name, phone, manufacture)

PK (PCM\_registrationID, manufacture)

FK (manufacture) 🡪 MANUFACTURE (manufacture)

PHARMACY(name, pharmacy\_license\_ID, and address, fulfill)

PK (pharmacy\_license\_ID, fulfill)

UN (name)

MEDICATION(barcodeNumber, name, formula, pharmaceutical\_manufacturer\_PCM\_registrationID, generics, brandName, patient, doctor, dosage, fulfill, date, price, prescribe, manufacture)

PK (barcodeNumber, prescribe, manufacture)

FK (patient) 🡪 PATIENT(FirstName, LastName)

FK (doctor) 🡪 DOCTOR(FirstName, LastName)

FK (fulfill) 🡪 PHARMACY (fulfill)

FK (manufacture) 🡪 MANUFACTURE (manufacture)

CHECK (formula IS NOT NULL)

MANUFACTURE (manufacture)

PK (manufacture)