Database Systems 10127

Homework Problem 2

Due Date: November 28, 2021

The assignment has two problems. The second one is on the second page.

You may work by yourself or in pairs.

1. **Table Normalization**

You are given the following table showing information about a clinic.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DoctorID | DoctorName | PatientID | PatientName | Appointment | Room |
| 8846 | Dr. Cannon | DA3467 | Del Andrus | Feb 2, 8:00 | 414 |
| 8846 | Dr. Cannon | KM2235 | Ken Moore | Feb 2, 8:30 | 414 |
| 5032 | Dr. Khoury | KM2235 | Ken Moore | Feb 2, 8:00 | 413 |
| 5032 | Dr. Khoury | JD6729 | Jill Drake | Feb 5, 9:00 | 412 |
| 1298 | Dr. Hauser | KE6662 | Kris Eddy | Feb 5, 9:00 | 413 |

Convert the table to table(s) in 3NF.

Show all the steps, going from 1NF to 2NF to 3NF.

**Note**: your choice of keys will make a difference in the end result. State any assumptions you make when selecting your keys.

Show all the functional dependencies.

Mark primary key(s) with an underline and foreign key(s) with an asterisk (\*)

1. **Relational Algebra**

A factory makes several products. The factory buys parts to make the different products from suppliers. There is a catalog that shows which suppliers make each part and how much the part costs.

Given these four relations:

Suppliers (Sid, Name, City)

Parts (Pid, Pname, ProductID)

Products (ProdID, ProdName)

Catalog (Sid, Pid, Cost)

Write expressions in relational algebra to find

1. The IDs of suppliers who sell parts for product A15
2. The names of suppliers who sell parts for product A15
3. The names of suppliers who sell parts for the product 'Bicycle'
4. The names of all the parts needed to make product C76
5. The names of all the parts needed to make the product 'Scooter'
6. The names of suppliers who sell a part for product B52 that costs less than 100.
7. The ids of suppliers who sell a part for product B52 that costs less than 100 and a part for product F18 that costs less than 100.
8. The names of suppliers who sell a part for product B52 that costs less than 100 and a part for product F18 that costs less than 100.
9. Pairs of Supplier ids (sid1, sid2) such that both suppliers sell the same part and the first supplier charges less for that part. HINT: create two temporary catalog relations.
10. The ID of the cheapest part.