DBI Lab 006 - Normalization Solution

COMP1048 - Databases and Interfaces

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Exercise 2 - Database Normalization

staffNo	dentistName	patientNo	patientName	appointment		surgeryNo
				date	time	
S1011	Tony Smith	P100	Gillian White	12-Aug-03	10.00	S10
S1011	Tony Smith	P105	Jill Bell	13-Aug-03	12.00	S15
S1024	Helen Pearson	P108	Ian MacKay	12-Sept-03	10.00	S10
S1024	Helen Pearson	P108	Ian MacKay	14-Sept-03	10.00	S10
S1032	Robin Plevin	P105	Jill Bell	14-Oct-03	16.30	S15
S1032	Robin Plevin	P110	John Walker	15-Oct-03	18.00	S13

The table shown above lists sample dentist/patient appointment data. A patient is given an appointment at a specific time and date with a dentist located at a particular surgery. On each day of patient appointments, a dentist is allocated to a specific surgery for that day.

1. The table shown above is susceptible to update anomalies. Provide examples of insertion, deletion, and update anomalies.

> **Insertion anomalies:**
>
> - To insert a new patient who makes an appointment with the designated Doctor, we need to enter the correct detail for the staff.
> - To enter new patient data that doesn't have Doctor to be assigned we can't insert NULL values for the primary key (assumed - `staffNo`, `patNo`, `date`)
>
> **Deletion anomalies:**
>
> - If we want to delete a patient named Ian MacKay for example, two records need to be deleted as in row 3 and 4. This anomaly also obvious when we want to delete the dentistName, multiple records needs to be deleted to maintain the data integrity.
> - When we delete a Dentist record, for example Tony Smith, the details about his patients also lost from the database.
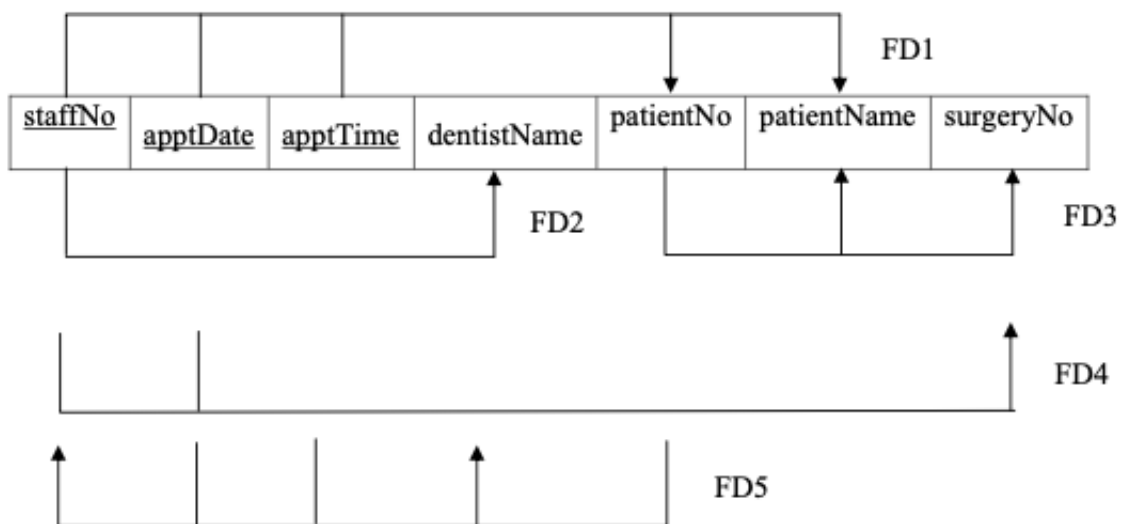
2. Identify the functional dependencies represented by the attributes shown in the table. State any assumptions you make about the data and the attributes shown in this table.

Assumptions

- o   A patient is registered at only one surgery
- o   A patient may have more than one appointment on a given day.
- o   All the schedules have been fixed for the whole days and week.

staffNo	apptDate	apptTime	dentistName	patientNo	patientName	surgeryNo

FD1

FD2

FD3

FD4

FD5

3. Describe and illustrate the process of normalizing the table to 3NF relations. Identify the primary, alternate, and foreign keys in your 3NF relations.

staffNo	dentistName

Dentist(staffNo, dentistName)

FK

staffNo	apptDate	surgeryNo

Surgery(staffNo, apptDate, surgeryNo)

patientNo	patientName

Patient(patientNo, patientName)

                                FK

staffNo	apptDate	apptTime	patientNo

Appointment(staffNo, apptDate, apptTime, patientNo)

4. Write an SQL script which creates the tables you designed. Your script should also insert the data shown in the table above.

Dentist(staffNo, dentistName)

Surgery(staffNo, apptDate, surgeryNo)

Patient(patientNo, patientName)

Appointment(staffNo, apptDate, apptTime, patientNo)