

staffNo	dentistName	patNo	patName	appointment date	time	surgeryNo
S1011	Tony Smith	P100	Gillian White	12-Sep-13	10.00	S15
S1011	Tony Smith	P105	Jill Bell	12-Sep-13	12.00	S15
S1024	Helen Pearson	P108	Ian MacKay	12-Sep-13	10.00	S10
S1024	Helen Pearson	P108	Ian MacKay	14-Sep-13	14.00	S10
S1032	Robin Plevin	P105	Jill Bell	14-Sep-13	16.30	S15
S1032	Robin Plevin	P110	John Walker	15-Sep-13	18.00	S13

The table shown in Figure 14.19 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.

- (a) The table shown in Figure 14.19 is susceptible to update anomalies. Provide examples of insertion, deletion, and update anomalies.
  - a. Since table is no normalize it can create several issues for example:
    - i. When inserting a new dentist. In order to insert its information we will need to insert a dummy info about a patient if this dentist doesn't have a patient yet. Thus we cannot insert the new dentist.
    - ii. When deleting, if we delete any of the rows we may lose valuable information about the dentist or the patient.
    - iii. When updating, we will need to update all the rows the information is presented, for example if Tony Smith change his name for Dr. Tony Smith, we will need to make all of these updates in every row this dentist is presented.
- (b) Identify the functional dependencies represented by the attributes shown in the table of Figure 14.19. State any assumptions you make about the data and the attributes shown in this table.
  - a. We can assume the following in order to identify the functional dependency:
    - i. staffNo can determine dentistName
    - ii. patNo can determine patName
    - iii. staffNo and appointmentDate determine surgeryNo, this is assuming that the dentist uses the same room for a day.

- iv. patNo, appointmentDate and time determine staffNo and surgeryNo, assuming every patient has one appointment at specific time and date.
  - v. staffNo, appointmentDate and Time determine patNom and patName.
- (c) Describe and illustrate the process of normalizing the table shown in Figure 14.19 to 3NF relations. Identify the primary, alternate, and foreign keys in your 3NF relations.
- a. Table is already 1NF since all datas are atomic.
  - b. 1NF to 2NF we eliminate partial dependencies
    - i. We create the Dentists table (staffNo PK, dentistName)
    - ii. Patients table (patNo PK, patName)
    - iii. Appointment Table (patNo FK, staffNo FK, appointmentDate, appointmentTime, surgeryNo) PK = patNo, appointmentDate, appointmentTime.
  - c. For 2NF to 3NF we aliminate transitive dependencies, since surgeryNo depends on staffNo and appointmentDate. Then what we can do is to create a table to determind on which date each dentist user the surgery.
    - i. SurgeryAllocation(staffNo FK, appoinmentDate, surgeryNo). PK = staffNo and appointmentDate.

Dentists	
staffNo	dentistName
S1011	Tony Smith
S1024	Helen Pearson
S1032	Robin Plevin

Patients	
patNo	patName
P100	Gillian White
P105	Jill Bell
P108	Ian MacKay
P110	John Walker

Appoinment			
patNo FK	staffNo FK	appointmetDate	appointmentTime
P100	S1011	12-Sep-13	10.00
P105	S1011	12-Sep-13	12.00
P108	S1024	12-Sep-13	10.00
P108	S1024	14-Sep-13	14.00
P105	S1032	14-Sep-13	16.30
P110	S1032	15-Sep-13	18.00

SurgeryAllocation		
staffNo FK	appointmentDate	surgeryNo
S1011	12-Sep-13	S15
S1011	12-Sep-13	S10
S1024	14-Sep-13	S10
S1032	14-Sep-13	S15
S1032	15-Sep-13	S13