

14.15 Table displaying sample dentist/patient appointment data

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

(a) Update Anomalies Examples

Insert – Whenever we want to insert a dentist, we need to have a patient for the dentist.

Delete – If we remove the patient Ian MacKay appointment, the dentist Helen Pearson information is also going to be disappeared from the table.

Update – If we want to update patient name because of having a typo error, we will need to go through every tuple the patient made appointment.

(b) Functional Dependencies

staffNo -> dentistName

patNo -> patName

According to the data in the current table, it looks like dentistName determines staffNo, patName determines patNo and patNo determines surgeryNo. But those 3 dependencies may not be true for all time. For the first 2 cases, same names are possible in reality. For the third case, we know that a patient can have more than one surgery. So, those FDs were discarded to satisfy the rule “true for all time”.

(c) Normalization

1NF – separated appointment datetime to appointment date and appointment time so it is easy to access and maintain the data. For example, we want to update all the appointment time of patient Jill Bell to an earlier morning slot like 10 AM, we just need to update the appointment time value without making changes to the appointment date.

staffNo	dentistName	patNo	patName	appointment Date	appointment Time	surgery No
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

2NF – removed data redundancies of staff and patient.

Staff table

staffNo	dentistName
S1011	Tony Smith
S1024	Helen Pearson
S1032	Robin Plevin

Patient table

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

Appointment table

staffNo	patNo	appointmentDate	appointmentTime	surgeryNo
S1011	P100	12-Sep-13	10.00	S15
S1011	P105	12-Sep-13	12.00	S15
S1024	P108	12-Sep-13	10.00	S10
S1024	P108	14-Sep-13	14.00	S10
S1032	P105	14-Sep-13	16.30	S15
S1032	P110	15-Sep-13	18.00	S13

3NF

All three tables are already in 3NF as there are no transitive dependencies in the 2NF.

staffNo is the primary key of Staff table and patNo for the Patient table.

Primary key for Appointment table is a composite key, staffNo and patNo together.

No alternate key in this case.

Appointment table has foreign key staffNo that references to Staff table and patNo that references to Patient table.