Database Design, CSCI 340, Spring 2016
Normalization to BCNF exercise, March 21

Decompose the following relation into BCNF if it is not already in BCNF.

ClientInterview

clientNo	interviewDate	interviewTime	staffNo	roomNo
CR76	13-May-09	10.30	SG5	G101
CR56	13-May-09	12.00	SG5	G101
CR74	13-May-09	12.00	SG37	G102
CR56	1-Jul-09	10.30	SG5	G102

Figure 15.1 ClientInterview relation.

Is ClientInterview in BCNF?

To answer this first find the FDs which seem to exist in ClientInterview.

There appear to be 4 FDs:

1. clientNo, interviewDate → interviewTime, staffNo, roomNo (assuming no clients have two appointments on the same day)
2. staffNo, interviewDate, interviewTime → clientNo, roomNo (assume that a staff member can't hold two client interviews at the same time)
3. roomNo, interviewDate, interviewTime → clientNo, staffNo (assume that two interviews can't be held in the same room at the same time)
4. staffNo, interviewDate → roomNo (staff get the room for the day)

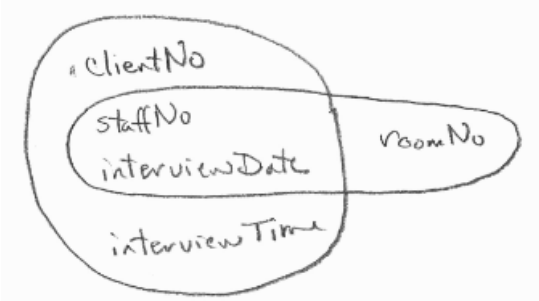
Next find the candidate keys for the relation. These are determined from the FDs. There are 3 candidate keys.

1. clientNo, interviewDate
2. roomNo, interviewDate, interviewTime
3. staffNo, interviewDate, interviewTime

The ClientInterview relation is not in BCNF because the determinant of the 4th FD is not a candidate key. (The 4th FD is kind of like a hidden FD. Hidden FDs cause anomalies.)

Decompose the ClientInterview relation using the 4th FD:

staffNo, interviewDate → roomNo



This gives the results:
RoomAssignment (staffNo, interviewDate, roomNo)
Interview (clientNo, interviewDate, interviewTime, staffNo)

ClientInterview

clientNo	interviewDate	interviewTime	staffNo
CR76	13-May-09	10.30	SG5
CR56	13-May-09	12.00	SG5
CR76	13-May-09	12.00	SG37
CR56	1-Jul-09	10.30	SG5

RoomAssignment

staffNo	interviewDate	roomNo
SG5	13-May-09	G101
SG37	13-May-09	G102
SG5	1-Jul-09	G102

Is Interview in BCNF?

There are 2 FDs:

1. clientNo, interviewDate → interviewTime, staffNo
2. staffNo, interviewDate, interviewTime → clientNo

Candidate keys:

1. clientNo, interviewDate
2. staffNo, interviewDate, interviewTime

The relation is in BCNF.

Is RoomAssignment in BCNF?

There is 1 FD:

1. staffNo, interviewDate → roomNo

Candidate key:

1. staffNo, interviewDate

The relation is in BCNF.

Notice, that the decomposition is lossless. The original relation can be recreated using a join operation.

Notice that the decomposition caused the following FD to be lost:

1. roomNo, interviewDate, interviewTime → clientNo, staffNo

If the clients determine that this FD is more important than the anomalies caused by the hidden FD, they may decide not to decompose the original relation.