

## Lab 5

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### Task 1.

We only need to give a counter example:

Consider the following schema; a b c and  $c \rightarrow b$  Clearly the above schema is in 3NF, because  $ab \rightarrow c$  is a superkey dependency and ,from  $c \rightarrow b$  we can see that  $b-c=b$ , which is a subset of the primary key (such dependency is also allowed in 3NF). But, the above schema is not in BCNF because  $c \rightarrow b$  is neither superkey nor trivial dependency. So we decompose above schema , keeping it lossless. Only possible lossless decomposition is: ac and cb. (because,their intersection c is primary key for the 2nd table). But clearly the dependency  $ab \rightarrow c$  is lost.

Hence, proved.

### Task 2.

Unit_ID	Tutor_ID	Topic	Room	Date
U1	Tut1	GMT	629	23.02.03
U2	Tut3	Gln	631	18.11.02
U5	Tut3	PhF	632	05.05.03
U4	Tut5	AVQ	621	04.07.03

Student_ID	Grade	Unit_ID
St1	4.7	U1
St1	5.1	U2
St4	4.3	U1
St2	4.9	U5
St2	5.0	U4

Topic	Book
GMT	Deumlich
Gln	Zehnder
PhF	Dummlers
AVQ	SwissTopo

Tutor_ID	TutEmail
Tut1	tut1@fhbb.ch
Tut3	tut3@fhbb.ch
Tut5	Tut5@fhbb.ch

### Task 3.

ProjectName	Budget	TeamSize	ProjectManager
Project1	1 kk \$	15	Manager1
Project2	1.5 kk \$	12	Manager2

ProjectManager	Position
Manager1	CTO
Manager2	CTO2

Task 4.

Group	Speciality
G1	S1
G2	S2

Speciality	Faculty
S1	F1
S2	F2

Task 5.

Project_ID	Department
P1	D1
P2	D2

Project_ID	Curator	TeamSize
P1	E1	100
P2	E2	120

TeamSize	ProjectGroupsNumber
100	5
120	6

Task 6.

The three design goals are lossless-join decompositions, dependency preserving decompositions, and minimization of repetition of information. They are desirable so we can maintain an accurate database, check correctness of updates quickly, and use the smallest amount of space possible.

Desirable decompositions: Lossless join, dependency preserving decompositions

Undesirable decompositions: A lossy decomposition