LAB-5

Task 1. *Will the conversion to BCNF be dependency preserving in any case? Proof your statement and give a reasoning for choosing BCNF design.*

BCNF can be used to obtain a lossless join decomp into 3NF (typically, can stop earlier) but does not ensure dependency preservation.

Proof:

We only need to give a counter example: Consider the following schema; a b c and c->b Clearly the above schema is in 3NF, because ab->c is a superkey dependency and ,from c->b we can see that b-c=b, which is a subset of the primary key (such dependency is also allowed in 3NF).

Task 2. *Given table in 1NF, convert to 3NF if PK is UnitID:*

UnitID	StudentID	Date	Tutor ID	Topic	Room	Grade	Book	TutEmail
U1	St1	23.02.03	Tut1	GMT	629	4.7	Deumlich	tut1@fhbb.ch
U2	St1	18.11.02	Tut3	Gln	631	5.1	Zehnder	tut3@fhbb.ch
U1	St4	23.02.03	Tut1	GMT	629	4.3	Deumlich	tut1@fhbb.ch
U5	St2	05.05.03	Tut3	PhF	632	4.9	Dümmlers	tut3@fhbb.ch
U4	St2	04.07.03	Tut5	AVQ	621	5.0	SwissTopo	tut5@fhbb.ch

UnitID	StudenID	Grade
U1	St1	4.7
U2	St1	5.1
U1	St4	4.3
U5	St2	4.9
U4	St2	5.0

TutorID	TutEmail
Tut1	tut1@fhbb.ch
Tut3	tut3@fhbb.ch
Tut1	tut1@fhbb.ch
Tut3	tut3@fhbb.ch
Tut5	tut5@fhbb.ch

UnitID	Topic	Book	TutorID	Room
U1	GMT	Deumlich	Tut1	629
U2	Gln	Zehnder	Tut3	631
U1	GMT	Deumlich	Tut1	629
U5	PhF	Dummlers	Tut3	632
U4	AVQ	SwissTopo	Tut5	621

UnitID	Topic	Date
U1	GMT	23.02.03
U2	Gln	18.11.02

U1	GMT	23.02.03
U5	PhF	05.05.03
U4	AVQ	04.07.03

Task 3. Given table in 1NF, convert to 2NF if PK is {ProjectName, ProjectManager}, use decomposition:

ProjectName	ProjectManager	Budget	Position	TeamSize
Project1	Manager1	1kk$	CTO	15
Project2	Manager2	1.5kk$	CTO2	12

ManagerID	ManagerName	TeamSize
1	Manager1	15
2	Manager2	12

ProjectID	ProjectName	Budget
1	Project1	1kk$
2	Project2	1.5kk$

ManagerID	ProjectID
1	1
2	2

Task 4. Given table, convert to 3NF if PK is Group, use decomposition:

Group	**Faculty**	**Speciality**
g1	**f1**	**s1**
g2	**f2**	**s2**

Speciality	Faculty
S1	F1
S2	F2

Group	Speciality
G1	S1
G2	S2

Task 5. Given table, convert to BCNF if PK is {ProjectID, Department}, use decomposition:

ProjectID	**Department**	**Curator**	**TeamSize**	**ProjectGroupsNumber**
p1	**d1**	**e1**	**100**	**5**
p2	**d2**	**e2**	**120**	**6**

ProjectID	Curator	TeamSize
P1	E1	100
P2	E2	200

ProjectID	Department
P1	D1
P2	D2

TeamSize	ProjectGroupsNumber
100	5
120	6

Task 6. List the three design goals for relational databases, and explain why each is desirable. Give an example of both desirable and undesirable types of decompositions.

The three design goals are lossless-join decompositions, dependency preserving decompositions, and minimization ofrepetition 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.