Lab 5

Task1. It is not possible to achieve both BCNF and dependency preservation.

·Consider a schema: *dept_advisor (s_ID, i_ID, department_name)*

·With function dependencies: *i_ID -> dept_name, s_ID, dept_name -> i_ID*

·*dept_advisor* is not in BCNF

  · *i_ID* is not a superkey

·Any decomposition of *dept_advisor* will not include all the attributes in *s_ID, dept_name->i_ID*

·Thus, the composition is not be dependency preserving.

Task2.

Unit table

UnitID	StudentID	TutorID	Date	Room	Grade
U1	St1	Tut1	23.02.03	629	4.7
U2	St1	Tut3	18.11.02	631	5.1
U1	St4	Tut1	23.02.03	629	4.3
U5	St2	Tut3	05.05.03	632	4.9
U4	St2	Tut5	04.07.03	621	5.0

Tutor table

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

Topic table

UnitID	Topic	Book
U1	GMT	Deumlich
U2	Gln	Zehnder
U5	PhF	Dümmlers
U4	AVQ	SwissTopo

Task3.

1 table

ProjectName	Budget	TeamSize
Project1	1 kk $	15
Project2	1.5 kk $	12

2 table

ProjectName	ProjectManager	Position
Project1	Manager1	CTO

| Project2 | Manager2 | CTO2 |

Task4.

Specialty	Group
S1	G1
S2	G2

Faculty	Specialty
F1	S1
F2	S2

Task5.

ProjectID	Curator	Department
P1	E1	D1
P2	E2	D2

ProjectID	TeamSize	ProjectGroupsNumber
P1	100	5
P2	120	6

Task6.

The goal of normalizing a relational database is to eliminate the flaws in the structure of the database that lead to redundancy, which, in turn, potentially leads to various anomalies and data integrity violations. There are two types of decomposition: lossy and lossless. The decompositions R1,R2,…,Rn for a relation schema R are said to be Lossless if there natural join results the original R.

$$R1 \bowtie R2 \bowtie R3 \ldots \bowtie Rn = R$$

The decompositions R1,R2,…, Rn for a relation schema R are said to be Lossy if there natural join results into addition of extraneous tuples with the original relation R.

$$R \subset R1 \bowtie R2 \bowtie R3 \ldots \bowtie Rn$$