**Task 1**

Will the conversion to BCNF be dependency preserving in any case? Proofyour statement and give a reasoning for choosing BCNF design.

It is not always possible to achieve both BCNF and dependency preservation

Proof with schema

* R = (A,B,C)

With function dependencies:

* B --- C
* A,C ---B

R is not in BCNF

* B is not a superkey

Any decomposition of R will not include all the attributes in

* A,C --- B

Thus, the composition is not dependency preserving advantages: we may have to use null values to represent some of the possible meaningful relationships among data items. There is the problem of repetition of information.

**Task 2**

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UnitID** | TutorID | Topic | Room | Date |
| U1 | Tut1 | GMT | 629 | 23.02.03 |
| U2 | Tut3 | Gln | 631 | 18.11.02 |
| U1 | Tut1 | GMT | 629 | 23.02.03 |
| U5 | Tut3 | PhF | 632 | 05.05.03 |
| U4 | Tut5 | AVQ | 621 | 04.07.03 |

|  |  |  |
| --- | --- | --- |
| **StudentID** | **UnitID** | Grade |
| St1 | U1 | 4.7 |
| St1 | U2 | 5.1 |
| St4 | U1 | 4.3 |
| St2 | U5 | 4.9 |
| St2 | U4 | 5.0 |

|  |  |
| --- | --- |
| **TutorID** | TutEmail |
| Tut1 | [tut1@fhbb.ch](mailto:tut1@fhbb.ch) |
| Tut3 | [tut3@fhbb.ch](mailto:tut3@fhbb.ch) |
| Tut5 | [tut5@fhbb.ch](mailto:tut5@fhbb.ch) |

|  |  |
| --- | --- |
| **Topic** | Book |
| GMT | Deumlich |
| Gln | Zehnder |
| PhF | Dummlers |
| AVQ | SwissTopo |

**Task3.**

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

|  |  |  |  |
| --- | --- | --- | --- |
| **ProjectName** | **ProjectManager** | TeamSize | Budget |
| Project1 | Manager1 | 15 | 1 kk $ |
| Project2 | Manager2 | 12 | 1.5 kk $ |

|  |  |
| --- | --- |
| **ProjectManager** | Position |
| Manager1 | CTO |
| Manager2 | CTO2 |

Task 4

**Given table, convert to 3NF if PK is Group, use decomposition:**

***Faculties have a number of specialities, each speciality consists of a set of particular groups.***

|  |  |
| --- | --- |
| **Group** | Specialty |
| g1 | s1 |
| g2 | s2 |

|  |  |
| --- | --- |
| **Specialty** | Faculty |
| s1 | f1 |
| s2 | f2 |

# Task5.

**Given table, convert to BCNF if PK is {ProjectID, Department}, use**

**decomposition:**

# *Curator depends on projectID and related departments, team*

|  |  |
| --- | --- |
| **ProjectID** | **Department** |
| p1 | d1 |
| p2 | d2 |

|  |  |  |
| --- | --- | --- |
| **ProjectID** | Curator | TeamSize |
| p1 | e1 | 100 |
| p2 | e2 | 120 |

|  |  |
| --- | --- |
| **TeamSize** | ProjectGrouosNumber |
| 100 | 5 |
| 120 | 6 |

**Task6.**

# Lossless Join Decomposition

-If the information is not lost from the relation that is decomposed, then the decomposition will be lossless.

-The lossless decomposition guarantees that the join of relations will result in the same relation as it was decomposed.

-The relation is said to be lossless decomposition if natural joins of all the decomposition give the original relation.

# Dependency Preserving Decomposition

-It is an important constraint of the database.

-In the dependency preservation, at least one decomposed table must satisfy every dependency.

-If a relation R is decomposed into relation R1 and R2, then the dependencies of R either must be a part of R1 or R2 or must be derivable from the combination of functional dependencies of R1 and R2.

**Repetition of information** – condition in database, that the values of one attribute are

determined by the values of another attribute in the same relation, and both values are repeated throughout the relation.