**Task1**. Will the conversion to BCNF be dependency preserving in any case? Proof your statement and give a reasoning for choosing BCNF design.

BCNF is not be dependency preserving. For example, if we consider a schema: dept\_advisor(student\_ID, instructor\_ID, dept\_name) with dependencies:

instructor\_ID -> dept\_name

student\_ID, dept\_name -> instructor\_ID.

dept\_advisor is not in BCNF: instructor\_ID is not a superkey. Any decomposition of dept\_advisor will not include all the attributes in student\_ID, dept\_name -> instructor\_ID.

Thus, the composition is NOT be dependency preserving

**Task2**.

|  |  |  |  |
| --- | --- | --- | --- |
| StudentID | Date | Room | Grade |
| St1 | 23.02.03 | 629 | 4.7 |
| St2 | 18.11.02 | 631 | 5.1 |
| St4 | 23.02.03 | 629 | 4.3 |
| St2 | 05.05.03 | 632 | 4.9 |
| St2 | 04.07.03 | 621 | 5.0 |

|  |  |  |
| --- | --- | --- |
| UnitID | Topic | Book |
| U1 | GMT | Deumlich |
| U2 | Gln | Zehnder |
| U5 | PhF | Dummlers |
| U4 | AVG | SwissTopo |

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

|  |  |  |
| --- | --- | --- |
| UnitID | StudentID | TutorID |
| U1 | St1 | Tut1 |
| U2 | St1 | Tut3 |
| U1 | St4 | Tut1 |
| U5 | St2 | Tut3 |
| U4 | St2 | Tut5 |

**Task3**.

|  |  |
| --- | --- |
| ProjectName | ProjectManager |
| Project1 | Manager1 |
| Project2 | Manager2 |

|  |  |  |
| --- | --- | --- |
| ProjectName | Budget | TeamSize |
| Project1 | 1kk $ | 15 |
| Project3 | 1,5kk $ | 12 |

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

**Task4**.

|  |  |
| --- | --- |
| Faculty | Speciality |
| F1 | S1 |
| F2 | S2 |

|  |  |
| --- | --- |
| Speciality | Group |
| S1 | G1 |
| S2 | G2 |

**Task5**.

|  |  |
| --- | --- |
| ProjectID | Curator |
| P1 | E1 |
| P2 | E2 |

|  |  |  |
| --- | --- | --- |
| Department | Teamsize | Curator |
| D1 | 100 | E1 |
| D2 | 120 | E2 |

|  |  |
| --- | --- |
| Teamsize | ProjectGroupNumber |
| 100 | 5 |
| 120 | 6 |

|  |  |
| --- | --- |
| ProjectID | Teamsize |
| P1 | 100 |
| P2 | 120 |

|  |  |
| --- | --- |
| ProjectID | Department |
| P1 | D1 |
| P2 | D2 |

**Task6**.

Goal for a relational database design is:

* BCNF
* Lossless join
* Dependency preservation

If we cannot achieve this, we accept one of

* Lack of dependency preservation
* Redundancy due to use of 3NF