1. BCNF is not always dependency preserving

 In BCNF, every non prime attribute should be functionally dependent on any of super key in schema. If there exists any FD, which don't follow this, then for that case we have to separate it into new relation. Now if any FD uses previous FD, then this creates non preservation of FD in BCNF.

BCNF is an extension of 3NF and it is has more strict rules than 3NF. Also, it is more stronger than 3 NF. This relation is in BCNF as it is already in 3Nf (there is no prime attribute deriving no prime attribute) and on the left hand side of the functional dependency there is a candidate key.

2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Unit\_id | Student\_id | Tutor\_id | Topic | Grade |
| U1 | St1 | Tut1 | GMT | 4.7 |
| U2 | St1 | Tut3 | GIn | 5.1 |
| U1 | St4 | Tut1 | GMT | 4.3 |
| U5 | St2 | Tut3 | PhF | 4.9 |
| U4 | St2 | Tut5 | AVQ | 5.0 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Unit\_id | Student\_id | Tutor\_id | Topic | Book |
| U1 | St1 | Tut1 | GMT | Deumlich |
| U2 | St1 | Tut3 | GIn | Zehnder |
| U1 | St4 | Tut1 | GMT | Deumlich |
| U5 | St2 | Tut3 | PhF | Dummler |
| U4 | St2 | Tut5 | AVQ | SwissTopo |

|  |  |  |
| --- | --- | --- |
| Unit\_id | Student\_id | Topic |
| U1 | St1 | GMT |
| U2 | St2 | GIn |
| U1 | St4 | GMT |
| U5 | St2 | PhF |
| U4 | St2 | AVQ |

|  |  |
| --- | --- |
| Tutor\_id | Topic |
| Tut1 | GMT |
| Tut3 | GIn |
| Tut3 | PhF |
| Tut5 | AVQ |

|  |  |
| --- | --- |
| Tutor\_id | TutEmail |
| Tut1 | tut1@fnbb.ch |
| Tut3 | [tut3@fnbb.ch](mailto:tut3@fnbb.ch) |
| Tut5 | [tut5@fnbb.ch](mailto:tut5@fnbb.ch) |

|  |  |  |
| --- | --- | --- |
| Tutor\_id | Date | Room |
| Tut1 | 23.02.03 | 629 |
| Tut3 | 18.11.02 | 631 |
| Tut3 | 05.05.03 | 632 |
| Tut5 | 04.07.03 | 621 |

3.

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

|  |  |
| --- | --- |
| ProjectManager | Position |
| Manager1 | CTO1 |
| Manager2 | CTO2 |

4.

|  |  |  |
| --- | --- | --- |
| Group | Faculty | Faculty\_name |
| G1 | F1 | FIT |
| G2 | F2 | Business school |

|  |  |  |
| --- | --- | --- |
| Group | Speciality | Speciality\_name |
| G1 | S1 | Information System |
| G2 | S2 | Finances |

5.

|  |  |  |
| --- | --- | --- |
| ProjectID | Department | Curator |
| P1 | D1 | C1 |
| P2 | D2 | C2 |

|  |  |  |
| --- | --- | --- |
| ProjectID | ProjectGroupsNumber | TeamSize |
| P1 | 5 | 100 |
| P2 | 6 | 120 |

|  |  |
| --- | --- |
| Department | Curator |
| D1 | C1 |
| D2 | C2 |

6. The three design goals are BCNF, Lossless join and Dependency preservation. They desirable so we can maintain an accurate database, check correctness of updates quickly, and use the smallest amount of space possible. Desirable type of decomposition: Lossless, undesirable type: Lossy.