Functional Dependencies with Normalization Proofs

1) Relation : College

Clg_id **-->** Clg_Rank

Clg_id **-->** Fees

Clg_id **-->** Clg_Name

Clg_id **-->** Highest_Package

Clg_id **-->** Location

Clg_id **-->** Est_year

Clg_Id --> Clg_type

Clg_Name **-->** Fees

Clg_Name**-->** Clg_Rank

Clg_Name **-->** High_Package

Clg_Name**-->** Location

Clg_Name**-->** Est_Year

Clg_Name **-->** Clg_Id

key:- Clg_Id, Clg_Name

NORMALIZATION PROOF : The relation is in BCNF as all the functional dependencies have their left hand side attribute as Key .

2) Relation : Program

Prog_id **-->** Girls: Boys

Prog_id **-->** Prog_Name

Prog_id **-->** % of students placed

Prog_id **-->** Avg_Package

Prog_id --> AI_Cat_name

Prog_id --> AI_Cat_Opening_Rank

Prog_id --> AI_Cat_Closing Rank

Prog_id --> HS_Cat_name

Prog_id --> HS_Cat_Opening_Rank

Prog_id --> HS_Cat_Closing Rank

Prog_id **-->** Intake

key:- Prog_Id

NORMALIZATION PROOF : The relation is in BCNF as all the functional dependencies have their left hand side attribute as Key .

3) Relation : Course

Course_Id **-->** Course_Name

Course_Id --> Prog_Id

key:- Course_Id

NORMALIZATION PROOF : The relation is in BCNF as all the functional dependencies have their left hand side attribute as Key .

4) Relation : Faculty

Faculty_Id **-->** Faculty_Name

Faculty_Id **-->** Qualification

Faculty_Id **-->** Experience

Faculty_Id --> Course_Id

Course_Id --> Faculty_Id

Course_Id --> Faculty_Name

Course_Id --> Qualifications

Course_Id --> experience

key:- Faculty_Id , Course_Id

NORMALIZATION PROOF : The relation is in BCNF as all the functional dependencies have their left hand side attribute as Key .

5) Relation : Offers

Key: Prog_Id

Prog_Id --> Clg_Id

NORMALIZATION PROOF : The relation is in BCNF as all the functional dependencies have their left hand side attribute as Key .

6) Relation : Contains

Key: Course_Id

Course_Id --> Prog_Id

The relation is in BCNF as all the functional dependencies have their left hand side attribute as Key .

7) Relation : Campus Facilities

Key: Clg_Id , Size

Clg_Id , Size --> Medical

Clg_Id , Size --> Sports facilities

Clg_Id , Size --> Library

Clg_Id --> Size

Clg_Id --> Medical

Clg_Id --> Library

Clg_Id --> Sports facilities

NORMALIZATION PROOF : The relation is in 1NF and not in BCNF because, after applying the BCNF decomposition algorithm on Campus Facilities (weak entity), we end up with R1 = { Size, Medical, Library, Sports facilities }, and

R2 = { Clg_Id }. Now, we cannot distribute any functional dependency to any relation. Hence, the algorithm stops and no further computation is possible. Therefore, Campus Facilities cannot be decomposed further so as to get converted to BCNF.