Proof of Normalization

Team ID – T302

1. ‘Users’ Relation :

- Attributes : { U_Id, F_Name, M_Name, L_Name, U_Email, U_Phone, Age, Linkedin_pro_link, PIN }

- Functional dependencies :

  U_Id → {F_Name,M_Name,L_Name,U_Email,U_Phone,Age,Linkedin_pro_link,PIN}
  U_Email → {U_Id,F_Name,M_Name,L_Name,U_Phone,Age,Linkedin_pro_link,PIN}
  U_Phone → { U_Id,F_Name,M_Name,L_Name,U_Email,Age,Linkedin_pro_link,PIN }
  Linkedin_pro_link → { U_Id,F_Name,M_Name,L_Name,U_Email,U_Phone,Age, PIN }

  Candidate Key = U_Id , U_Email , U_Phone , Linkedin_pro_link

- Let X = U_Id
  X^+={U_Id,F_Name,M_Name,L_Name,U_Email,U_Phone,Age,Linkedin_pro_link,PIN}

  Thus, **Primary Key = U_Id**
  Foreign key = PIN

- The left side of all the FDs in the minimal FD set of relation ‘Users’ Contains the super key only, therefore the relation “Users” is in BCNF.

2. ‘Users_Address’ Relation :

- Attributes : { PIN, Address_Line1, Address_Line2, City, State, Country }

- Functional dependencies :

  PIN → Address_Line1
  PIN → Address_Line2
  PIN → City
  PIN → State
  PIN → Country

- $\{ PIN \}^{+}$ = { Address_Line1,Address_Line2,City,State,Country }

  Thus , **Primary Key = PIN**

- The left side of all the FDs in the minimal FD set of relation ‘Users_Address’ Contains the super key only, therefore the relation “Users_Address” is in BCNF.

3. ‘Skills’ Relation :

- Attributes : { U_Id , Skill_Name }
- Functional dependencies :

  { U_Id ,Skill_Name } → {U_Id , Skill_Name}

- **Primary Key = { U_Id , Skills_Name}**
  Foreign key = U_Id
- Closure of any Subset of { U_Id ,Skill_Name } does not give all attributes of the relation.
- The left side of all the FDs in the minimal FD set of relation ‘Skills’ Contains the super key only, therefore the relation “Skills” is in BCNF.

4. ‘Project’ Relation :

- Attributes : { U_Id,Project_Name,Project_Link,Description }

- Functional dependencies :

  { U_Id,Project_Name } → Project_Link
  { U_Id,Project_Name } → Description

- { U_Id,Project_Name }$^{+}$ = { U_Id,Project_Name ,Project_Link,Description }

  Thus, **Primary Key = { U_Id , Project_Name }**
  Foreign key = U_Id

- Closure of any Subset of { U_Id ,Project_Name } does not give all attributes of the relation.

- The left side of all the FDs in the minimal FD set of relation ‘Project’ Contains the super key only, therefore the relation “Project” is in BCNF.

5. ‘Achievement’ Relation :

- Attributes : { U_Id , Title , Description }
- Functional dependencies :

  { U_Id , Title } → Description

- **Primary Key = { U_Id , Title }**
  Foreign key = U_Id
- Closure of any Subset of { U_Id ,Title} does not give all attributes of the relation.
- The left side of all the FDs in the minimal FD set of relation ‘Achievement’ Contains the super key only, therefore the relation “Achievement” is in BCNF.

6. ‘Education’ Relation :

- Attributes : { U_Id, Institute_Name, Degree, Description, Grade, Total_Grade, Start_date, End_date }

- Functional dependencies :

  { U_Id , Degree } → Institute_Name
  { U_Id , Degree } → Description
  { U_Id , Degree } → Total_Grade
  { U_Id , Degree } → Grade
  { U_Id , Degree } → Start_date
  { U_Id , Degree } → End_date

- { U_Id , Degree }$^{+}$ = { U_Id,Degree,Institute_Name,Description, Grade,Total_Grade,Start_date,End_date }

  Thus , **Primary Key = { U_Id , Degree }**
  Foreign key = U_Id

- Closure of any Subset of { U_Id ,Degree } does not give all attributes of the relation.

- The left side of all the FDs in the minimal FD set of relation ‘Education’ Contains the super key only, therefore the relation “Education” is in BCNF.

7. ‘Experience’ Relation :

- Attributes : { U_Id,Location,Company,Title,Description, Start_date,End_date }

- Functional dependencies :

  { U_Id , Title , Company } → Location
  { U_Id , Title , Company } → Description
  { U_Id , Title , Company } → Start_date
  { U_Id , Title , Company } → End_date

- { U_Id , Title , Company }$^{+}$ = { U_Id,Title,Company,Location, Description,Start_date,End_date }

  Thus , **Primary Key = { U_Id , Title , Company }**
  Foreign key = U_Id

- Closure of any Subset of { U_Id ,Title, Company } does not give all attributes of the relation.

- The left side of all the FDs in the minimal FD set of relation ‘Experience’ Contains the super key only, therefore the relation “Experience” is in BCNF.

8. ‘Company’ Relation :

- Attributes : { C_Id,C_Name,C_Manager,C_Description, C_Web_link }

- Functional dependencies :

  C_Id → { C_Name,C_Manager,C_Description,C_Web_link }
  C_Name → { C_Id,C_Manager,C_Description,C_Web_link }
  C_Web_link → { C_Id,C_Name,C_Manager,C_Description }

  Candidate Key = { C_Id,C_Name,C_Web_link }

- Let X = C_Id
  X^+ = { C_Id,C_Name,C_Manager,C_Description, C_Web_link }

  Thus , **Primary Key = C_Id**

- The left side of all the FDs in the minimal FD set of relation ‘Company’ Contains the super key only, therefore the relation “Company” is in BCNF.

9. ‘Company_Email’ Relation :

- Attributes : { C_Id , C_Email }
- Functional dependencies :

  { C_Id , C_Email } → { C_Id , C_Email }

- **Primary Key = { C_Id , C_Email }**
  Foreign key = C_Id

- Closure of any Subset of { C_Id ,C_Email } does not give all attributes of the relation.
- The left side of all the FDs in the minimal FD set of relation ‘Company_Email’ Contains the super key only, therefore the relation “Company_Email” is in BCNF.

10. ‘Company_Phone’ Relation :

- Attributes : { C_Id , C_Phone }
- Functional dependencies :

  { C_Id , C_Phone } → { C_Id , C_Phone }

- **Primary Key = { C_Id , C_Phone }**
  Foreign key = C_Id

- Closure of any Subset of { C_Id ,C_Phone } does not give all attributes of the relation.
- The left side of all the FDs in the minimal FD set of relation ‘Company_Phone’ Contains the super key only, therefore the relation “Company_Phone” is in BCNF.

11. 'Job_opening' Relation :

- Attributes : { C_Id,Location,Requirment,Status, Appli_deadline,Job_Quality,Job_Roll,Salary }

- Functional dependencies :

  { C_Id , Location , Job_Quality , Job_Roll } → Requirment
  { C_Id , Location , Job_Quality , Job_Roll } → Status
  { C_Id , Location , Job_Quality , Job_Roll } → Appli_deadline
  { C_Id , Location , Job_Quality , Job_Roll } → Salary

- **Primary Key = { C_Id , Location , Job_Quality , Job_Roll }**
  Foreign key = C_Id

- Closure of any Subset of { C_Id , Location , Job_Quality , Job_Roll } does not give all attributes of the relation.

- The left side of all the FDs in the minimal FD set of relation 'Job_opening' Contains the super key only, therefore the relation "Job_opening" is in BCNF.

12. ‘Application’ Relation :

- Attributes : { U_Id,C_Id,Status,Job_Title }
- Functional dependencies :

  { U_Id , C_Id } → Status
  { U_Id , C_Id } → Job_Title

- **Primary Key = { U_Id , C_Id }**
- Closure of any Subset of { U_Id , C_Id } does not give all attributes of the relation.
- The left side of all the FDs in the minimal FD set of relation ‘Application’ Contains the super key only, therefore the relation “Application” is in BCNF**.**

Thank You