GROUP-16

Functional Dependencies

1. **Personal Detail (This table is in BCNF)**

   HealthcardID→Fname

   HealthcardID→Lname

   HealthcardID→Father_name

   HealthcardID→Mother_name

   HealthcardID→ Gender

   HealthcardID→Dob

   HealthcardID→ Address_line1

   HealthcardID→ Address_line2

   HealthcardID→ State

   HealthcardID→ City

   HealthcardID→Pincode

   Birth_Certificate_ID→Fname

   Birth_Certificate_ID→Lname

   Birth_Certificate_ID→Father_name

   Birth_Certificate_ID→Mother_name

   Birth_Certificate_ID→ Gender

   Birth_Certificate_ID→Dob

   Birth_Certificate_ID→ Address_line1

   Birth_Certificate_ID→ Address_line2

   Birth_Certificate_ID→ State

   Birth_Certificate_ID→ City

Birth_Certificate_ID→Pincode

{HealthcardID, Birth_Certificate_ID}→Fname

{HealthcardID, Birth_Certificate_ID}→Lname

{HealthcardID, Birth_Certificate_ID}→Father_name

{HealthcardID, Birth_Certificate_ID}→Mother_name

{HealthcardID, Birth_Certificate_ID}→ Gender

{HealthcardID, Birth_Certificate_ID}→Dob

{HealthcardID, Birth_Certificate_ID}→ Address_line1

{HealthcardID, Birth_Certificate_ID}→ Address_line2

{HealthcardID, Birth_Certificate_ID}→ State

{HealthcardID, Birth_Certificate_ID}→ City

{HealthcardID, Birth_Certificate_ID}→Pincode

Constraints:-

➢ **Candidate Keys**: {HeathcardID}, {Birth_Certificate_ID}, {HeathcardID, Birth_Certificate_ID}

➢ **Primary Key**: {Heathcard_ID}

➢ **Foreign Key:** None

➢ **Referential:** None

➢ **Domain:** {Healthcard_ID int,

        BirthcertificateID int,

        Fname varchar(20),

        Lname varchar(20),

        Father_name varchar(20),

        Mother_name varchar(20),

        Gender char(1),

Dob date,

Address_line1 varchar(100),

Address_line2 varchar(100),

State varchar(20),

City varchar(20),

Pincode numeric(6)}

- ➢ **Non-key Attributes**: {Fname, Lname, Father_name, Mother_Name, Gender, Dob, Address_line1, Address_line2, State, City, Pincode}

2. **Laboratory_Detail (This table is in BCNF)**

   Lab_ID➔Lab_name

   Lab_ID➔Contact

   Constraints:-
   - ➢ **Candidate Keys**: {Lab_ID}
   - ➢ **Primary Key**: {LabID}
   - ➢ **Foreign Key:**None
   - ➢ **Referential:** None
   - ➢ **Domain:** {Lab_ID int,

     Lab_name varchar(20),

     Contact int}
   - ➢ **Non-key Attributes**: {Lab_name, Contact}

3. **Health-Card(This table is in 1NF)**

   HealthCard_ID➔Hospital_ID

   HealthCard_ID➔Policy_ID

   HealthCard_ID➔Lab_ID

- ➢ **Heathcard_ID can't be written as Candidate key and primary key because here, HealthCard_ID is acting as Foreign Key.**
- ➢ **The table cannot be converted to BCNF as this table will contain multiple records of a particular HealthCard_ID .Therefore, according to the requirements of the project, there will be no primary key in this table.**

Constraints:-

- ➢ **Primary Key**: None

- ➢ **Foreign Key:** {Heathcard_ID, Hospital_ID, Insurance_policy_ID, Lab_ID}

- ➢ **Referential:** {Personal_detail, hospital, insurance_policy, laboratory_detail}

- ➢ **Domain:** {HealthCard_ID int,

    Hospital_ID int,

    Insurance_policy_ID int,

    Lab_ID int}

- ➢ **Non-key Attributes**: {Heathcard_ID, Hospital_ID, Insurance_policy_ID, Lab_ID}

4. **Laboratory_Address(This table is in 1NF)**

    Lab_ID→Address_line1

    Lab_ID→Address_Line2

    Lab_ID→State

    Lab_ID→City

    Lab_ID→Area

    Lab_ID→Pincode

- ➢ **Lab_ID can't be written as Candidate key and primary key because here, Lab_ID is acting as Foreign Key**
- ➢ **To convert the table into BCNF, we made {Lab_ID,Address_Line1,Address_Line2} as the primary key which uniquely identifies all the other attributes. Therefore the table is now in BCNF.**
- ➢ **The new functional dependencies are as follows:**

> **Laboratory_Address(This table is in BCNF)**

{Lab_ID,Address_line1,Address_line2}→Address_line1

{Lab_ID,Address_line1,Address_line2}→Address_Line2

{Lab_ID,Address_line1,Address_line2}→State

{Lab_ID,Address_line1,Address_line2}→City

{Lab_ID,Address_line1,Address_line2}→Area

{Lab_ID,Address_line1,Address_line2}→Pin Code

Constraints:-

> **Primary key:** {Lab_ID, Address_line1, Address_line2}

> **Foreign Key:** Lab_ID

> **Referential: {**Laboratory_detail}

> **Domain:** { Lab_ID int,

        Address_line1 varchar(100),

        Address_line2 varchar(100),

       State   varchar(20),

       City varchar(20),

       Pincode numeric(6)}

> **Candidate Key:** {Lab_ID, Address_line1, Address_line2}

> **Non-key Attributes**: {State, City, Area, Pincode}

5. **Private_Laboratory (This table is in BCNF)**

Report_Id→PDate

Report_Id→Year

Report_Id→Lab_id

- **Candidate Keys**: {Report_ID}

- **Primary Key**: {Report_ID}

- **Foreign Key:** {Lab_ID}

- **Referential:** {Laboratory_detail}

- **Domain:** { Report_ID int,

  PDate date,

  Year numeric(4),

  Lab_ID int }

- **Non-key Attributes**: {Date, Year, Lab_id}

6. **Hospital (This table is in BCNF)**

    Hospital_ID→Hospital_name

    Hospital_ID→Contact

Constraints:-

- **Candidate Keys**: {Hospital_ID}

- **Primary Key**: {Hospital_ID}

- **Foreign Key:** None

- **Referential:** None

- **Domain:** {Hospital_ID int,

  Hospital_name varchar(20),

  Contact int}

- **Non-key Attributes**: {Hospital_name, Contact}

7. **Hospital_Address (This table is in 1NF)**

Hospital_ID→Address_Line1

Hospital_ID→Address_Line2

Hospital_ID→State

Hospital_ID→City

Hospital_ID→Area

Hospital_ID→Pincode

➢ **Hospital_ID can't be written as Candidate key and primary key because here, Hospital_ID is acting as Foreign Key.**

➢ **To convert the table into BCNF, we made {Hospital_ID,Address_Line1,Address_Line2} as the primary key which uniquely identifies all the other attributes. Therefore the table is now in BCNF.**

➢ **The new functional dependencies are as follows:**

➢ **Hospital_Address (This table is in BCNF)**

{Hospital_ID,Address_Line1,Address_Line2}→Address_Line1

{Hospital_ID,Address_Line1,Address_Line2}→Address_Line2

{Hospital_ID,Address_Line1,Address_Line2}→State

{Hospital_ID,Address_Line1,Address_Line2}→City

{Hospital_ID,Address_Line1,Address_Line2}→Area

{Hospital_ID,Address_Line1,Address_Line2}→Pincode

Constraints:-

➢ **Candidate Keys**: {Hospital_ID,Address_Line1,Address_Line2}

➢ **Primary Key**: {Hospital_ID,Address_Line1,Address_Line2}

➢ **Foreign Key:** {Hospital_ID}

➢ **Referential:** {Hospital}

- ➤ **Domain:** {Hospital_ID int,
    Address_line1 varchar(100),
    Address_line2 varchar(100),
    State varchar(20),
    City varchar(20),
    Pincode numeric(6)}

- ➤ **Non-key Attributes**: {State, City, Area, Pincode}

8. Doctor_Detail (This table is in BCNF)

Doctor_ID→Doctor_Name

Doctore_ID→Contact

Constraints:-

- ➤ **Candidate Keys**: {Doctor_ID}
- ➤ **Primary Key**: {Doctor_ID}
- ➤ **Foreign Key:** None
- ➤ **Referential:** None
- ➤ **Domain:** {Doctor_ID int, Doctor_name varchar(20), Contact int}
- ➤ **Non-key Attributes**: {Doctor_name, Contact}

9. Disease (This table is in BCNF)

Disease_ID→Disease_Name

Disease_ID→Description

Constraints:-

- ➢ **Candidate Keys**: {Disease_ID}

- ➢ **Primary Key**: {Disease_ID}

- ➢ **Foreign Key:** None

- ➢ **Referential:** None

- ➢ **Domain:** {Disease_ID int,

    Disease_name varchar(20),

    Description varchar(100)}

- ➢ **Non-key Attributes**: {Disease_name, Description}

10. Insurance_company (This table is in BCNF)

Insurance_company_id→Company_Name

Constraints:-

- ➢ **Candidate Keys**: {Insurance_company_id}

- ➢ **Primary Key**: {Insurance_company_id}

- ➢ **Foreign Key:** None

- ➢ **Referential:** None

- ➢ **Domain:** {Insurance_company_id int,

    Company_Name varchar(20)}

- ➢ **Non-key Attributes**: {Company_name}

11. Insurance_policy (This table is in BCNF)

Insurance_policy_id→Policy_Name

Insurance_policy_id→Description

Insurance_policy_id→Insurance_company_ID

Constraints:-

- **Candidate Keys**: {Insurance_policy_id}

- **Primary Key**: {Insurance_policy_id}

- **Foreign Key:** {Insurance_Company_ID}

- **Referential: {**Insurance_Company}

- **Domain:** {Insurance_policy_ID int,
  Policy_Name varchar(20),
  Description varchar(100),
  Insurance_company_ID int}

- **Non-key Attributes**: {Policy_name, Description, Insurance_company_ID}

12. Private_Hospital_Cases (This table is in BCNF)

Case_ID→Case_Report

Case_ID→Medical Prescription

Case_ID→Date

Case_ID→Year

Case_ID→Hospital_id

Case_ID→Doctor_ID

Case_ID→Disease_ID

Case_ID→HealthCard_ID

Case_ID→Insurance_Policy_ID

{Case_ID,HealthCard_ID}→Case_Report

{Case_ID,HealthCard_ID}→Medical Prescription

{Case_ID,HealthCard_ID}→Date

{Case_ID,HealthCard_ID}→Year

{Case_ID,HealthCard_ID}→Hospital_id

{Case_ID,HealthCard_ID}→Doctor_ID

{Case_ID,HealthCard_ID}→Disease_ID

{Case_ID,HealthCard_ID}→HealthCard_ID

{Case_ID,HealthCard_ID}→Insurance_Policy_ID

Constraints:-

- **Candidate Keys**: {Case_ID}, {Case_ID,HealthCard_ID}

- **Primary Key**: {Case_ID}

- **Foreign Key:** {Hospital_ID, Doctor_ID, Disease_ID, HealthcardID, Insurance_Policy_ID}

- **Referential:** {Hospital, Doctor_Detail, Disease, Personal_Detail, Insurance_Policy}

- **Domain:** {Case_ID int,

  Case_report varchar(20),

  Medical_Prescription varchar(20),

  Date date,

  Year numeric(4),

  Hospital_ID int,

  Doctor_ID int,

  Disease_ID int,

  Healthcard_ID int

  Insurance_policy_ID int }

- **Non-key Attributes**: {Case_Report, Medical Prescription, Date, Year, Hospital_id, Doctor_ID, Disease_ID, Insurance_policy_id}

➢ **Anomalies**

➢ **Insertion Anomaly**

INSERT INTO lab5.private_hospital_cases VALUES (506,'xyz.pdf','paracetamol 2 times in the day','2014-08-20',2014,101,103,1003,7,201);

```
Data Output   Explain   Messages   Notifications

ERROR:  insert or update on table "private_hospital_cases" violates foreign key constraint
"private_hospital_cases_healthcard_id_fkey"
DETAIL:  Key (healthcard_id)=(7) is not present in table "personal_detail".
SQL state: 23503
```

➢ **Update and Delete Anomaly**

➢ There are no update and delete anomalies in our project as we have used ON UPDATE CASCADE/ ON DELETE CASCADE /ON DELETE RESTRICT constraints.