Group Id:-16

Bug Management System

Group Representative:-

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Group Members:-

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Minimal FD Set and Proof of BCNF:

1) Customer Relation

Customer (Customer_ID, Customer_Name, Email_ID, Contact_NO, Address_Line_1, City, State, Country)

Functional Dependencies:-

Customer_ID -> {Customer_Name, Email_ID, Contact_NO, Address_Line_1, City, State, Country}

City -> {State, Country}

State -> {Country}

Minimal FD Set:-

Customer_ID -> Customer_Name

Customer_ID -> Email_ID

Customer_ID -> Contact_NO

Customer_ID -> Address_Line_1

Customer_ID -> City

City -> State

State -> Country

Closure:-

{Customer_ID}+ = {Customer_ID ,Customer_Name, Email_ID, Contact_NO, Address_Line_1, City, State, Country}

{City}+ = {City, State, Country}

{State}+ = {State, Country}

Key: Customer_ID

Relation Customer is not in BCNF.

Culprit FDs: City -> {State, Country} and State -> {Country}

2) Employee Relation

Employee (Employee_ID, Emoloyee_Name, Team_ID, Email_ID, Contact_NO, Designation)

Functional Dependencies:-

Employee_ID -> {Emoloyee_Name, Team_ID, Email_ID, Contact_NO, Designation}

Minimal FD Set:-

Employee_ID -> Emoloyee_Name

Employee_ID -> Team_ID

Employee_ID -> Email_ID

Employee_ID -> Contact_NO

Employee_ID -> Designation

Closure:-

{Employee_ID}+ = {Employee_ID, Emoloyee_Name, Team_ID, Email_ID, Contact_NO, Designation}

Key: Employee_ID

Relation Employee is in BCNF as all the non-prime attributes are depended only on Employee_ID which is a key attribute.

3) Departments Relation

Departments (Department_ID, Department_Name, Department_Manager_ID, City, State)

Functional Dependencies:-

Department_ID -> {Department_Name, Department_Manager_ID, City, State}

Department_Manager_ID -> {Department_ID, Department_Name, City, State}

City -> {State}

Minimal FD Set:-

Department_ID -> Department_Name

Department_ID -> Department_Manager_ID

Department_ID -> City

Department_Manager_ID -> Department_ID

City -> State

Closure:-

{Department_ID}+ = {Department_ID, Department_Name, Department_Manager_ID, City, State}

{Department_Manager_ID}+ = {Department_ID, Department_Name, Department_Manager_ID, City, State}

{City}+ = {City,State}

Key: Department_ID, Department_Manager_ID

Relation Departments is not in BCNF.

Culprit FDs: City -> {State}

4) Projects Relation

Projects (Project_ID, Project_Name, Customer_ID, Project_type, Start_Date, End_Date, Team_ID)

Functional Dependencies:-

Project_ID -> {Project_Name, Customer_ID, Project_type, Start_Date, End_Date, Team_ID}

Minimal FD Set:-

Project_ID -> Project_Name

Project_ID ->Customer_ID

Project_ID ->Project_type

Project_ID ->Start_Date

Project_ID ->End_Date

Project_ID ->Team_ID

Closure:-

{Project_ID}+ ={Project_ID, Project_Name, Customer_ID, Project_type, Start_Date, End_Date, Team_ID}

Key: Project_ID

The Relationship project is in BCNF because there is only one key in the table and all the non-prime attributes are dependent on the key attribute which is Project_ID.

5) Bug_Details Relation

Bug_Details (Bug_ID, Reporter_ID, Project_ID, Bug_Title, Bug_Description, Status, Type, Severity, Report_Date)

Functional Dependencies:-

Bug_ID -> {Reporter_ID, Project_ID, Bug_Title, Bug_Description, Status,Type, Severity, Report_Date}

Minimal FD Set:-

Bug_ID ->Reporter_ID

Bug_ID ->Project_ID

Bug_ID ->Bug_Title

Bug_ID ->Bug_Description

Bug_ID ->Status

Bug_ID ->Type

Bug_ID ->Severity

Bug_ID ->Report_Date

Closure:-

{Bug_ID}+ = {Bug_ID, Reporter_ID, Project_ID, Bug_Title, Bug_Description, Status, Type, Severity, Report_Date}

Key: Bug_ID

The Relationship Bug details are in BCNF because there is only one key in the table and all the non-prime attributes are dependent on the key attribute which is **Bug_ID**.

6) Teams Relation:
Teams (Team_ID, Team_Name, Department_ID, Team_Lead_ID)

Functional Dependencies:-
Team_ID-> {Team_Name, Department_ID, Team_Lead_ID}
Team_Lead_ID-> {Team_ID, Team_Name, Department_ID}

Minimal FD Set:-
Team_ID->Team_Name
Team_ID->Department_ID
Team_ID->Team_Lead_ID
Team_Lead_ID->Team_ID

Closure:-

{Team_ID}+= {Team_ID, Team_Name, Department_ID, Team_Lead_ID}

{Team_Lead_ID}+= {Team_Name, Team_Lead_ID, Department_ID, Team_Name}

Key:Team_ID

Relation Teams is in BCNF as all the non-prime attributes are dependent on key attributes which are Team_ID and Team_lead_ID

7) Patch_Details Relation:
Patch_Details (Patch_ID,Bug_ID,team_ID,Patch_Date,Patch_Description)

Functional Dependencies:-
Patch_ID-> {Bug_ID,team_ID,Patch_Date,Patch_Description}

Minimal FD Set:-
Patch_Id-> Bug_ID
Patch_Id-> Team_ID
Patch_Id-> Patch_Date
Patch_Id-> Patch_Description

Closure:-

{Patch_ID}+= {Patch_ID, Bug_ID, team_ID, Patch_Date, Patch_Description}

Key:Patch_ID
Patch_Details relation is in BCNF as key attribute Patch_ID can identify all the other attributes.

8) Update_Details Relation
Update_Details (Version_ID, Project_ID, Status, Update_Date)

Functional Dependencies:-
Version_ID-> {Project_ID, Status, Update_Date}

Minimal FD Set:-
Version_Id-> Project_ID
Version_Id-> Status
Version_Id-> Update_Date

Closure:-

{Version_ID}+-> {Version_Id, Project_ID ,Status, Update_Date}

Key:Version_ID

Update_Details relation is in BCNF as key attribute Version_ID can identify all the other attributes.

9) Release_Details Relation
Release_Details { Patch_ID, Version_ID, Release_Date}

Functional Dependencies:-
(Patch_ID,Version_ID)-> {Release_Date}

Minimal FD Set:-
(Patch_Id,Version_ID)-> Release Date

Closure:-

{Patch_ID,Version_ID}+= {Patch_ID, Version_ID, Release_Date}

Key: {Patch_ID,Version_ID}

Relation Release_Details is in BCNF as the non-prime attribute Release_Date is dependent on key attribute {Patch_ID,Version_ID} and cannot be derived by only one of those key.