

Functional Dependencies

1.) Blood Bank (Bank ID, Name, Pincode)

Candidate Key: Bank ID

Closure of Bank ID = {Name, Pincode} therefore it is a candidate key.

Bank ID -> Name

Bank ID -> Pincode

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Bank ID is the super-key for every functional dependency therefore this relation is BCNF.

2.) Donor(Donor_aadharid, Name, Gender, Blood_group, Pincode, Contact, Mother_aadhar_id, Father_aadhar_id, DOB)

Candidate Key: Donor_aadhar_id

Closure of Donor_aadhar_id = {Name, Gender, Blood_group, Pincode, Contact, Mother_aadhar_id, Father_aadhar_id, DOB} therefore it is a candidate key.

Donor_aadhar_id -> Name

Donor_aadhar_id -> Gender

Donor_aadhar_id -> Blood_group

Donor_aadhar_id -> Pincode

Donor_aadhar_id -> Contact

Donor_aadhar_id -> Mother_aadhar_id

Donor_aadhar_id -> Father_aadhar_id

Donor_aadhar_id -> DOB

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Donor_aadhar_id is the super-key for every functional dependency therefore this relation is BCNF.

3.) Receiver (Receiver_aadar_id, Name, Gender, Blood_group, Pincode, Contact, Mother_aadhar_id, Father_aadhar_id, DOB)

Candidate Key: Receiver_aadhar_id

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

Receiver_aadhar_id -> Name
Receiver_aadhar_id -> Gender
Receiver_aadhar_id -> Blood_group
Receiver_aadhar_id -> Pincode
Receiver_aadhar_id -> Contact
Receiver_aadhar_id -> Mother_aadhar_id
Receiver_aadhar_id -> Father_aadhar_id
Receiver_aadhar_id -> DOB

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Receiver_aadhar_id is the super-key for every functional dependency therefore this relation is BCNF.

4.) **Blood_Bank_Staff (Staff_aadhar_id, Name, Contact, DOB)**

Candidate Key: Staff_aadhar_id

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

Staff_aadhar_id -> Name
Staff_aadhar_id -> Contact
Staff_aadhar_id -> DOB

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Staff_aadhar_id is the super-key for every functional dependency therefore this relation is BCNF.

5.) **Staff_worked_on (Date_of_joining, Staff_aadhar_id, Bank_id, Date_of_leaving, salary, Type_of_work)**

Candidate Key: {Date_of_joining, Staff_aadhar_id}

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

{Date_of_joining, Staff_aadhar_id} -> Bank_id
{Date_of_joining, Staff_aadhar_id} -> Date_of_leaving
{Date_of_joining, Staff_aadhar_id} -> Salary
{Date_of_joining, Staff_aadhar_id} -> Type_of_work

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: {Date_of_joining, Staff_aadhar_id} is the super-key for every functional dependency therefore this relation is BCNF.

6.) Hospital (Hospital_id, Name, Contact, Pincode)

Candidate Key: Hospital_id

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

Hospital_id \rightarrow Name

Hospital_id \rightarrow Contact

Hospital_id \rightarrow Pincode

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Hospital_id is the super-key for every functional dependency therefore this relation is BCNF.

7.) Organization (Organization_id, Name, Contact, Pincode)

Candidate Key: Organization_id

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

Organization_id \rightarrow Name

Organization_id \rightarrow Contact

Organization_id \rightarrow Pincode

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Organization_id is the super-key for every functional dependency therefore this relation is BCNF.

8.) Hospital_request_to (Hospital_id, Data_requested, Bank_id, Blood_Group, Quantity_ml, accepted)

Candidate Key: {Hospital_id, Data_requested, Bank_id, Blood_Group, Quantity_ml}

Closure of candidate key above includes all attributes of Inventory, therefore it is key

{Hospital_id, Data_requested, Bank_id, Blood_Group, Quantity_ml} -> accepted

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: {Hospital_id, Data_requested, Bank_id, Blood_Group, Quantity_ml} is the super-key for every functional dependency therefore this relation is BCNF.

9.) Receiver_request_to (Receiver_aadhar_id, Date_requested, Bank_id, Quantity, Status)

Candidate Key: {Receiver_aadhar_id, Date_requested}

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

{Receiver_aadhar_id, Date_requested} -> Bank_id

{Receiver_aadhar_id, Date_requested} -> Quantity

{Receiver_aadhar_id, Date_requested} -> Status

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: {Receiver_aadhar_id, Date_requested} is the super-key for every functional dependency therefore this relation is BCNF.

10.) Drive (Drive_ID, Organised_at, Date_Organised, Managed_by)

Candidate Key: {drive_id}

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

drive_id -> organised_at

drive_id -> date_organised_at

drive_id -> managed_by

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: { drive_id } is the super-key for every functional dependency therefore this relation is BCNF.

11.) Blood (Sample_id, Bank_id, Taken_out_by, Date_taken_out, Donated_by, Quantity_ml)

Candidate Key: Sample_id

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

Sample_id -> Bank_id

Sample_id -> Taken_out_by

Sample_id -> Date_taken_out

Sample_id -> Donated_by

Sample_id -> Quantity_ml

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Sample_id is the super-key for every functional dependency therefore this relation is BCNF.

12.) Drive Staff (Drive_id, Staff_id)

Candidate Key: {Drive_id, Staff_id}

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: {Drive_id, Staff_id} is the super-key for every functional dependency therefore this relation is BCNF.

13.) Volunteer (Volunteer_aadhar_id, Name, Contact)

Candidate Key: Volunteer_aadhar_id

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

Volunteer_aadhar_id -> Name

Volunteer_aadhar_id -> Contact

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Volunteer_aadhar_id is the super-key for every functional dependency therefore this relation is BCNF.

14.) **Volunteered_in (Volunteered_in, Drive_id)**

Candidate Key: {Volunteered_in, Drive_id}

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: {Volunteered_in, Drive_id} is the super-key for every functional dependency therefore this relation is BCNF.

15.) **Test (Donor_aadhar_id, Date_of_test, Pulse_bpm, Haemoglobin, Any_previous_donations, Are_you_clean, Any_diabetic_problems, Are_you_ill)**

Candidate Key: {Donor_aadhar_id, Date_of_test}

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

{Donor_aadhar_id, Date_of_test} \rightarrow Pulse_bpm

{Donor_aadhar_id, Date_of_test} \rightarrow Haemoglobin

{Donor_aadhar_id, Date_of_test} \rightarrow Any_previous_donations

{Donor_aadhar_id, Date_of_test} \rightarrow Are_you_clean

{Donor_aadhar_id, Date_of_test} \rightarrow Any_diabetic_problems

{Donor_aadhar_id, Date_of_test} \rightarrow Are_you_ill

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: {Donor_aadhar_id, Date_of_test} is the super-key for every functional dependency therefore this relation is BCNF.

16.) **Booked a slot (Donor_aadhar_id, Date_booked, Bank_id, Organisation_id)**

Candidate Key: {Donor_aadhar_id, Date_booked}

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

{Donor_aadhar_id, Date_booked} \rightarrow Bank_id

{Donor_aadhar_id, Date_booked} \rightarrow Organisation_id

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: {Donor_aadhar_id, Date_booked} is the super-key for every functional dependency therefore this relation is BCNF.

17.) Further Test (Sample_id, HIV, Hepatitis, RBC, WBC, Platelet)

Candidate Key: Sample_id

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

Sample_id \rightarrow HIV

Sample_id \rightarrow Hepatitis

Sample_id \rightarrow RBC

Sample_id \rightarrow WBC

Sample_id \rightarrow Platelet

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Sample_id is the super-key for every functional dependency therefore this relation is BCNF.

18.) Donated_to_hospital (Sample_id, Hospital_id, Date_given)

Candidate Key: Sample_id

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

Sample_id \rightarrow Hospital_id

Sample_id \rightarrow Date_given

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Sample_id is the super-key for every functional dependency therefore this relation is BCNF.

19.) Donated_to_receiver (Sample_id, Receiver_aadhar_id, Date_given)

Candidate Key: Sample_id

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

Sample_id -> Receiver_id

Sample_id -> Date_given

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Sample_id is the super-key for every functional dependency therefore this relation is BCNF.

20.) Inventory (Item Code, Bank_id, Item_name)

Candidate Key: Item Code

Closure of candidate key above includes all attributes of Inventory, therefore it is key.

Item Code -> Bank_id

Item Code -> Type

Item Code -> Item_name

1st NF: No multiple or composite attributes therefore 1st NF is satisfied.

2nd NF: There is no partial dependency so 2nd NF is satisfied.

3rd NF: There is no transitive dependency for non-prime attributes. In non-trivial FD $X \rightarrow Y$; X is the super-key which is satisfied.

BCNF: Item Code is the super-key for every functional dependency therefore this relation is BCNF.