Functional Dependencies & Normalization

Let

- A = U_TYPE
- B = U_NAME
- C = EMAIL
- D = PASSWORD
- E = CONTACT
- F = DOB
- G = GENDER
- H = BLOOD_GROUP
- I = LAST_DONATED
- J = BID
- K = HID

Functional Dependencies:

FD = { B → C

B → D

B → E

B → F

B → G

B → H

B → I

E → B

C → B

J → A

K → A}

NOTE: No two Donors can have same Email ID or Contact Info.

SUPER KEY: A Set of Attributes where we can identify a row uniquely in a table.

CANDIDATE KEY: A Super Key whose subset is not a Super Key.

Here,

SUPER KEYS → U_NAME, CONTACT, EMAIL, BID, HID

CANDIDATE KEYS → U_NAME, CONTACT, EMAIL, BID, HID

PRIMARY KEY → U_NAME, BID, HID

1st Normal Form:

- No Donor can have multiple Names, Email IDs, Passwords, or Blood Groups.
- Even if they have multiple Names, Email IDs, Passwords, or Blood Groups, then Separate row can be maintained in a Table.

2nd Normal Form:

- This form should not have partial dependency i.e., closure of proper subset of a key should not contain non-prime attribute.
- B, C, E, J, K are Super Keys.
- Proper Subset of each of the keys is Null set
- We can't get non-prime attributes at RHS of FDs because we can't find closure for a Null set.
- So it is in 2nd NF.

3rd Normal Form:

- This form should not have transitive dependency i.e., if the RHS of a FD has a non-prime Attribute the LHS of the FD should be a Super Key.
- Here for every FD, if there is a non-prime attribute in RHS then we have super key in LHS.
- So it is in 3rd NF.

Boyce-Codd Normal Form:

- If for each FD if LHS is a Super Key then it is in BCNF.
- Here it's absolutely true.
- So it is in BCNF.