

# 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 = { A  $\rightarrow$  J  
A  $\rightarrow$  K  
B  $\rightarrow$  C  
B  $\rightarrow$  D  
B  $\rightarrow$  E  
B  $\rightarrow$  F  
B  $\rightarrow$  G  
B  $\rightarrow$  H  
B  $\rightarrow$  I  
E  $\rightarrow$  B  
C  $\rightarrow$  B }

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

### **1<sup>st</sup> 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.

### **2<sup>nd</sup> 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 2<sup>nd</sup> NF.

### **3<sup>rd</sup> 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 3<sup>rd</sup> 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.