

Functional dependency and Normalization

Courier:

<u>C_ID</u>	C_Name	C_Dispatch_Date	C_Status	C_Delivery_Date	<u>S_ID(FK)</u>
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<u>B_ID(FK)</u>	<u>Rate_ID(FK)</u>	<u>P_ID(FK)</u>	<u>T_ID(FK)</u>	<u>R_ID(FK)</u>	<u>E_ID(FK)</u>
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All are in BCNF

{C_ID} → C_Name (BCNF)

{C_ID} → C_Dispatch_Date (BCNF)

{C_ID} → C_Status (BCNF)

{C_ID} → C_Delivery_Date (BCNF)

{C_ID} → S_ID (BCNF)

{C_ID} → B_ID (BCNF)

{C_ID} → Rate_ID (BCNF)

{C_ID} → P_ID (BCNF)

{C_ID} → T_ID (BCNF)

{C_ID} → R_ID (BCNF)

{C_ID} → E_ID (BCNF)

{C_ID}⁺ = {C_ID, C_Name, C_Dispatch_Date, C_Status, C_Delivery_date, S_ID, B_ID, Rate_ID, P_ID, T_ID, R_ID, E_ID}

All the attributes are determined from Super Key so the relation is in BCNF, as it is in BCNF it is also in 3NF, 2NF, 1NF.

Sender:

<u>S_ID</u>	First_Name	Last_Name	Area	City	State	<u>B_ID(FK)</u>
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{S_ID} → First Name (BCNF)

{S_ID} → Last Name (BCNF)

{S_ID} → Area (BCNF)

{S_ID} → City (BCNF)

{S_ID} → State (BCNF)

$\{S_ID\} \rightarrow B_ID \quad (BCNF)$
 $\{S_ID\}^+ = \{S_ID, \text{First Name}, \text{Last Name}, \text{Area}, \text{City}, \text{State}, B_ID\}$

Receiver

<u>R_ID</u>	First_Name	Last_Name	Area	City	State
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All are in BCNF

$R_ID \rightarrow \text{First Name} \quad (BCNF)$
 $R_ID \rightarrow \text{Last Name} \quad (BCNF)$
 $R_ID \rightarrow \text{Area} \quad (BCNF)$
 $R_ID \rightarrow \text{City} \quad (BCNF)$
 $R_ID \rightarrow \text{State} \quad (BCNF)$
 $\{R_ID\}^+ = \{R_ID, \text{First Name}, \text{Last Name}, \text{Area}, \text{City}, \text{State}\}$

All the attributes are determined from Super Key so the relation is in BCNF , as it is in BCNF it is also in 3NF,2NF,1NF.

Rate

<u>Rate_ID</u>	C_Weight	C_Distance	C_Type	C_Rate
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All are in BCNF

$\text{Rate_ID} \rightarrow C_Weight \quad (BCNF)$
 $\text{Rate_ID} \rightarrow C_Distance \quad (BCNF)$
 $\text{Rate_ID} \rightarrow C_Type \quad (BCNF)$
 $\text{Rate_ID} \rightarrow C_Rate \quad (BCNF)$
 $\{\text{Rate_ID}\}^+ = \{\text{Rate_ID}, C_Weight, C_Distance, C_Type, C_Rate\}$

All the attributes are determined from Super Key so the relation is in BCNF , as it is in BCNF it is also in 3NF,2NF,1NF.

Transport

<u>T_ID</u>	<u>B_ID</u> (FK)	T_TYPE
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All are in BCNF

T_ID → B_ID (BCNF)

T_ID → T_Type (BCNF)

{T_ID}⁺ = {T_ID, B_ID, T_Type }

All the attributes are determined from Super Key so the relation is in BCNF , as it is in BCNF it is also in 3NF,2NF,1NF.

Branch

<u>B_ID</u>	B_NAME	B_ADDRESS	B_CONTACT
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All are in BCNF

B_ID → B_Name (BCNF)

B_ID → B_Address (BCNF)

B_ID → B_Contact (BCNF)

{B_ID}⁺ → {B_ID, B_Name, B_Address, B_Contact }

All the attributes are determined from Super Key so the relation is in BCNF , as it is in BCNF it is also in 3NF,2NF,1NF.

Payment

<u>P_ID</u>	TX_ID	P_DATE	P_AMOUNT	<u>B_ID</u> (FK)
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All in BCNF

P_ID → TX_ID (BCNF)

P_ID → P_Date (BCNF)

P_ID → P_Amount (BCNF)

P_ID → B_ID (BCNF)

{P_ID}⁺ = {P_ID, TX_ID, P_Date, P_Amount, B_ID}

All the attributes are determined from Super Key so the relation is in BCNF , as it is in BCNF it is also in 3NF,2NF,1NF.

Employee:

<u>E_ID</u>	E_NAME	E_DOB	E_CONTACT	E_GENDER	<u>B_ID(FK)</u>
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ALL IN BCNF

$E_ID \rightarrow E_Name$ (BCNF)

$E_ID \rightarrow E_DOB$ (BCNF)

$E_ID \rightarrow E_Contact$ (BCNF)

$E_ID \rightarrow E_Gender$ (BCNF)

$E_ID \rightarrow B_ID$ (BCNF)

$\{E_ID\}^+ = \{E_ID, E_Name, E_DOB, E_Contact, E_Gender, B_ID\}$

All the attributes are determined from Super Key so the relation is in BCNF , as it is in BCNF it is also in 3NF,2NF,1NF.

Designation:

<u>E_ID(FK)</u>	Salary	DesignationName
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All in BCNF

$\{E_ID\} \rightarrow Salary$ (BCNF)

$\{E_ID\} \rightarrow DesignationName$ (BCNF)

$\{E_ID\}^+ = \{E_ID, Salary, DesignationName\}$

All the attributes are determined from Super Key so the relation is in BCNF , as it is in BCNF it is also in 3NF,2NF,1NF.

SEND TO:

<u>S_ID(FK)</u>	<u>R_ID(FK)</u>
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All in BCNF

$\{S_ID, R_ID\} \rightarrow S_ID$ (BCNF)

$\{S_ID, R_ID\} \rightarrow R_ID$ (BCNF)

$\{S_ID, R_ID\}^+ = \{S_ID, R_ID\}$

All the attributes are determined from Super Key so the relation is in BCNF , as it is in BCNF it is also in 3NF,2NF,1NF.

RETURN:

<u>E_ID(FK)</u>	<u>B_ID(FK)</u>
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All are in BCNF

$\{E_ID, B_ID\} \rightarrow E_ID$ (BCNF)

$\{E_ID, B_ID\} \rightarrow B_ID$ (BCNF)

$\{E_ID, B_ID\}^+ = \{E_ID, B_ID\}$

All the attributes are determined from Super Key so the relation is in BCNF , as it is in BCNF it is also in 3NF,2NF,1NF.

DEPENDENTS:

<u>E_ID(FK)</u>	<u>Dep_Name</u>	<u>Dep_Relation</u>	<u>Dep_Contact</u>
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As the Dependent table violate the rule of 1NF which is all tuples must be atomic so, it is not in 1NF form.

<u>E_ID(FK)</u>	<u>Dep_Name</u>	<u>Dep_Relation</u>	<u>Dep_Contact</u>
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All in BCNF

$\{E_ID, Dep_Name, Dept_Relation\} \rightarrow Dep_Name$ (BCNF)

$\{E_ID, Dep_Name, Dept_Relation\} \rightarrow Dep_Relation$ (BCNF)

$\{E_ID, Dep_Name, Dept_Relation\} \rightarrow Dep_Contact$ (BCNF)

$\{E_ID, Dep_Name, Dept_Relation\}^+ = \{E_ID, Dep_Name, Dept_Relation, Dep_Contact\}$

All the attributes are determined from Super Key so the relation is in BCNF , as it is in BCNF it is also in 3NF,2NF,1NF.

