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BANKING SYSTEM DATABASE

NORMALIZATION:

Normalization of the Relational schema:

Normalization is done for minimizing the data redundancy in the database model of the Banking System Database .

For normalization you need to check if the system is in 1NF,2NF, and 3NF.

1NF-2 conditions :

1. None of the table's columns should contain multiple values.
2. No redundant data.

In above none of the column contain multiple values but the redundant data is there like in the Branch table the city values repeats. Similarly, in Customer and the Employee.
So, we need to make the third table named the **Location**.

Location (**Loc_ID**, city, street, zip)
Branch (**Branch_id**, B_name, ***Loc_ID***)
Loan (**L_ID**, L_Type, L_Amount, ***Branch_ID***)
Account (**A_num**, A_type, S_IR,S_CO,Access,balance,***C_ID*** ,***Branch_id***)
Payment_receipt (**Preceipt_id**, issue_date, pay_amt)
Employee (**E_Num**, Fname, Lname, job_title, E_SSN, St_date, Dept,***Branch_id, Loc_ID***))
Customer (**C_ID**, C_Fname,C_Lname, C_SSN, ***L_id***, ***E_Num, Loc_ID***)
Availed_by **(C_ID, L_id,** Issue_date, Taken_amount)

2NF-2 conditions :

• Schema should be in 1NF
• No partial dependency

As there is only one table
Availed_by **(C_ID, L_ID,** issue_date, taken_amount)
Two non-key attributes like issue_date, taken_amount are dependent on composite key so, no partial dependency.
So, the above schema after 2NF is as below:
Location (**Loc_ID**, city,street, zip)
Branch (**Branch_id**, B_name, ***Loc_id***)
Loan (**L_ID**, L_type, L_amt, ***B_id***)
Account (**A_num**, A_type, S_IR, S_CO, Access, balance,
C_ID ,***Branch_id***)
Payment_receipt (**Preceipt_id**, Issue_date, pay_amt, ***C_num, L_id***)
Employee (**E_num**, Fname, Lname, job_title, E_SSN, St_date, Role,
Dept, ***Branch_id***)
Customer (**C_ID**,C_Fname, C_Lname, C_SSN, ***L_id***, ***E_num, Loc_ID*****)**
Availed_by **(C_ID, L_id,** Issue_date, Taken_amount)

3NF-2 conditions :

• Schema should be in 2NF
• No transitive dependency

In the table of the Loan the L_type is transitively dependent on the L_id so, it violates the 3NF need a new table as below:
Loan_Category (**Loan_cat_id**, L_desc)
Similarly, in an employee the dept is transitively dependent on the E_num. So, need a new table department.
Department(**dept_no**, title)
The Lname in employee is transitively dependent on the E_num, the E_SSN. So, need a new table person.
Person (**P_SSN**, Fname, Lname)
Employee (**E_num**, , job_title , St_date, Role,
P_SSN ,dept_no ,Branch_id**))**
Customer (**C_ID**, C_Fname, C_Lname, C_SSN, ***L_id***, ***E_num, Loc_ID*****)**

Normalized Schema

After 3NF the finalized schema is as follows:

• Location (**Loc_id**, city,street, zip)
• Branch (**Branch_id**, B_name, ***Loc_id***)
• Loan_Category (**Loan_cat_id**, L_desc)
• Department(**dept_no**, title)
• Person (**P_SSN**, Fname, Lname)
• Loan (**L_id**, L_amt, ***Branch_id, Loan_cat_id***)
• Account (**A_num**, A_type, S_IR, S_CO, Access, balance, ***C_ID ,Branch_id***)
• Employee (**E_num**, , job_title , St_date, Role, ***P_SSN ,dept_no ,Branch_id*****))**
• Customer (**C_ID**, C_Fname, C_Lname, C_SSN, ***L_ID***, ***E_num, Loc_ID*****)**
• Payment_receipt (**Preceipt_id**, issue_date, pay_amt, ***C_ID, L_id***)
• Availed_by **(C_ID, L_id,** Issue_date, Taken_amount)