Task No: 8 Normalizing databases using functional dependencies upto BCNF

Date: 30/09/25

Aim:

To perform normalization upto BCNF Based on given dependencies.

Banking database :-

1. Identify Banking attributes :- Customer, Account, Branch, Banker info, loan, Credit-card
2. Relational Schema : Banking (Customer, Account, Branch, Banker info, Loan, Credit-card)
3. Functional dependencies (FD's between Attributes):

Customer ID → Name, Address, Ph-no
Account-number → Account-Name, category
Branch-ID → Brach Name, Location, ifsc-code
Banker-ID → Banker-name, Ph-no
Customer-ID → Account-number
Loan-ID → Loan-Account
Customer-ID → loan-ID

Step 2 : Convert to 1NF :

* No repeating group or Arrays
* All attributes are atomic

The schema is in 1NF

Step 3 : Convert to 2NF

* All primary keys are single-column keys, so no partial dependencies exist
* However, we ensure foreign key attributes are managed correctly.

Output : The schema is already in 2NF

Step 4 : Convert it to 3NF

Eliminate Transitive dependencies.

* Customer-ID → Account-number, (Branch-ID, ~~loan-ID~~) → Loan ID → move Loan-ID to a Sepalate loan table.
* Customer-ID → Name, Address, Ph-no
  → Already in Sepalate Users table

* Account_number → customer_ID → Branch_ID
→ No redundancy

All transitive dependencies removed.

Step 5: Convert to BCNF

Check if every determinant is a candidate key:

* Customer_ID, Account_Number, Branch_ID, Loan_ID are all are unique keys for their respective tables.
* Foreign keys like Customer_ID... donot violate BCNF rules

All FDs comply with BCNF - no Further decomposition needed.

Using Griffith Tool:

1. Input relational schema and functional dependencies.
2. Gritfith tool generates a dependency graph
3. Analyze the graph to identify Normalization issues
4. Apply normalization to transformation schema.
5. Verify the resulting schema meets BCNF Criteria.

Normalization Schema:

Customer (customer_ID, Name, Ph-no)

Account (Account_number, Account_name, Category)

Branch (Branch_ID, Branch_name, Location, ifsc_code)

Banker info (Banker_ID, Name, Ph-no)

Loan (loan_ID, Customer_ID, Amount)

Credit_card (Credit_card_Number, Customer_ID, Limit)

Class Record.

VEL TECh	
EX NO.	8
PERFORMANCE (5)	5
RESULT AND ANALYSIS (5)	5
VIVA VOCE (5)	5
RECORD (5)	5
TOTAL (20)	15
SIGN WITH DATE	

30/9/19

VEL TECH	
EX No.	8
PERFORMANCE (5)	5
RESULT AND ANALYSIS (3)	3
VIVA VOCE (3)	3
RECORD (4)	-
TOTAL (15)	-
SIGN WITH DATE	

Result :

Thus, the implementation of normalizing the database upto BCNF Based on given dependence was successfully executed.