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⇒ INTRODUCTION –

Our mini-world digs deep inside the banking system, for all kind of database requirements by a bank. Starting from the head-quarter to its branches in different cities, towns and villages, containing data of all the banks employs and the bank account details. This database can be used by the bank for its day to day work including transactions and other employee related work like working shifts, pay etc., including storing very confidential data like details of credit and debit card. Can be used to do analysis on various kinds of stuffs like getting details of people who have not paid their loan and those who have not paid for insurance, and also if someone had less money than what the min value asked to store by the bank, checking last transaction through the bank etc.

Calculating total number of employee the bank has and the total cash that the bank and all its branches and ATM have whether they are greater than what they had to be or not, Is there need to send cash to

ATM and branches or not .All these tasks can be easily performed using this database.

The database had different layers which can be accessed by the peoples who have the permission to modify or look at that data like the pay of employee's, creating a new employee database.

Since everything is password protected all employees will have different access inside the database and they can't change and disturb the data outside their domain.

⇒ **DATABASE REQUIREMENT SECTION –**

1) 5 Entity type ->

- A) Bank
- B) Bank Branch
- C) Customer
- D) Loan
- E) Account

2) 1 Entity with 2 key attributes ->

Customer -

- A) Account Number.
- B) Adhaar Card

3) Weak Entity type ->

- A) Loan
- B) Payment
- C) Transaction
- D) Dependent

4) Relation types ->

- A) Offer
- B) Manages
- C) Borrow
- D) Has
- E) Supervise
- F) Employs
- G) Owned by

5) $N > 3$ degree relation -> Relation type "Offers" with $N=6$

6) At least one subclass -> Cards entity has two subclass.

7) Some attributes ->

- A) Composite attributes -> Name
 - B) Multivalued attributes -> Contact no.
 - C) Derived attributes -> Address, Loan_ID, Payment_ID, Transaction_ID.
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⇒ Bank is given an unique Id by the government (**bank_id, type = Int, size < 64 Bytes**), they have a head quarter (**bank_hq_address, type = String, size < 1000 bytes**), and a Name (**bank_name, type = String, size < 300 Bytes**), No of employee working (**num_employee type = Int, size < 512 bytes**), net cash available percentage (**cash_available_percentage, type = Int, size < 64 bytes, should be greater than 3**) which had to be to be greater than 3%.

⇒ Bank has an employee (**employee_name, type = String, size < 500 Bytes**) including CEO of the bank who is responsible for looking after bank for share-holder, CEO's and other employees position

(**employee_position**, type = String, size < 200 Bytes), contact No (**contact_num**, type = Int, size < 128 Bytes, should have 10 digits), Employee's Aadhar No. (**aadhar_num**, type = Int, size < 128 Bytes, should be 12 digit number), Address (**e_address**, type = String , size < 1000), DOB (**e_dob**, type = Int, size <128 Bytes,should be greater than 01012001 (DDMMYYYY)), salary (**e_salary**, type = Int , size < 1024 Bytes) its identification Number given by the Bank when the employee joined bank (**e_id** , type = Int, size < 128 Bytes), are to be stored ,these details are also to be stored for every Branch of the Bank.

- ⇒ Name of the Employee's dependent (**e_dependent** , type = String, size < 128 Bytes) are also sorted along-side of details of employee details.
- ⇒ Bank has no of ATM's distributed across different regions (**atm_address**, type = String, size < 1000 Bytes), they have unique identification number, given by the Bank (**atm_id**, type = Int, size <128 Bytes).The amount of cash in the ATM (**atm_cash**, type = Int, size <1024 Bytes) is tracked by bank. Bank also keeps track of when it was last filled (**atm_refill_time**, type = Int, size <128 Bytes).
- ⇒ Bank has Branches (**branch_name**, type = String, size <300 Bytes) at different places (**branch_address**, type = String, size <1000 Bytes) to reach people (**customer**), these Branches have special code (**branch_code**, type = Int, size <128 Bytes) to differentiate the branch. Every Branch has a Manager (**Employee**) along with other workers, whose track is kept. These branches have Name which is also composed of Bank_Name and location of the Branch (**branch_address**, type = String, size <1000 Bytes), track is kept of

all customers who have this branch as Home Branch (**cust_home_branch, type = String, size <300 Bytes**) and How much cash the Branch currently Hold (**branch_cash_ , type = Int, size <1024 Bytes, should be greater than Rs 50,000**) minimum cash they could hold differs from branch to branch.

- ⇒ These Branches Manages Accounts of customer and offer other financial services like insurance,loan etc.
- ⇒ Account has a number (**account_num , type = Int, size <128 Bytes**),date of creation(**account_dob, type = Int, size <128 Bytes, should be greater than 01012005 (DDMMYYYY)**) and hold some amount of money (**account_money, type = Int, size <1024 Bytes**) which can't be negative. Different type (**account_types, type = string, size <500 Bytes**) are there like kid Account, NRI Account, saving and current with their own speciality and services.
- ⇒ Customer has a Name (**cust_name, type = String, size <500 Bytes**), PAN (**cust_pan, type = String, size <128 Bytes**), contact No. (**cust_contact_num, type = Int, size < 128 Bytes, should have 10 digits**), DOB(**cust_dob, type = Int, size <128 Bytes**), Age, Aadhar Number (**cust_aadhar, type = Int, size <128 Bytes, should be 12 digit number**), Address (**cust_permanent_address, type = String, size <1000 Bytes**), Account No.(**account_num, type = Int, size <128 Bytes**) where other details are stored. All the services availed by the customer are linked to the Account (**cust_service, type = String, size <500 Bytes**) which is stored differently in that service centre.
- ⇒ Customer is given a cheque book containing cheques (**cheque_num , type = Int, size <128 Bytes**), UPI(**upi_id, type =**

String, size < 200 Bytes) payment gateway and different cards i.e Credit card having different (**card_num , type = Int, size <512 Bytes, should be 16 digit number**),(**card_valid, type = Int, size <128 Bytes**),and Pin (**card_pin, type = Int, size <32 Bytes, should be 4 digit number**), customer may also take credit card which have same attributes, using any of these or another method customer do transaction and payment which is a weak entity with derived key.

⇒ Loan is also a weak entity, but it has Date (**loan_dob, type = Int, size <128 Bytes**), Account No is linked with it. Loan key attribute derived from Account No. and Date.

⇒ **FUNCTIONAL REQUIREMENT SECTION –**

a) INSERT :-

- (1) New employees, with his/her full details like name, address, dependents, aadhar, DOB, position at which he/she is hired, salary.
- (2) New account, type of account, Name of account holder, date of creation, initial-amount deposited, linked cards, cheque, and UPI detail.
- (3) New customer should be saved with services he/she is taking.
- (4) New branch, its id, name, address, employee's detail, amount stored there.
- (5) New ATM, its id, location, cash stored initially.

b) DELETE :-

- (1) Delete customer who had deactivated service.
- (2) Delete account if account not used for more than 10 years or if asked for deletion of account by the holder.
- (3) Branch with all detail after closing of the branch.
- (4) Delete all details of the ATM which had been closed down.
- (5) Cards, cheque, UPI services if asked or other reason.
- (6) Employee with all details after he leaves the job or other reason.

c) MODIFY :-

- (1) customers/employee's detail update.
- (2) Update loan status.
- (3) Linking of account with different services used by the account holder.
- (4) Account detail update.
- (5) Updating current amount after transaction or payment.
- (6) Updating employee details.
- (7) Updating Bank details.
- (8) Updating Branch details.
- (9) Updating ATM details.

d) SEARCH :-

(1) Customer search :-

Query :- Name or account no. or aadhar or date_of_becoming_customer or text_matching_of_name , aadhar

Result :- Table containing all matched results with name, contact no., account no., Aadhar no. and service availed by the customer.

(2) Employee search :-

Query :- id or Name or account no. or aadhar or date_of_joining or text_matching_of_name , aadhar

Result :- Table containing all matched results with name, contact no., account no., Aadhar no. and post.

(3) Branch search :-

Query :- text_matcing_for_name_of_branch or branch code, or some key words of location of branch.

Result :- table containing name of manager, branch ,code, location, contact no, of branch.

e) PROJECTION :-

(1) Amount in account :-

Query :- greater then “some amount” or less then “some amount”.

Result :- table containing account no., name of account holder, amount present.

(2) Loan amount :-

Query :- greater than “amount” and less then amount.

Result :- table containing loan Id, name of taker, type of loan.

f) AGGREGATE :-

- (1) Function to calculate net amount cash reserve of bank.
- (2) Function to calculate net amount in an account.
- (3) Intersect calculation function for having accounts.
- (4) Function to find min & max amount in an account in duration of “t” months.

g) SELECTION :- (text matching in names)

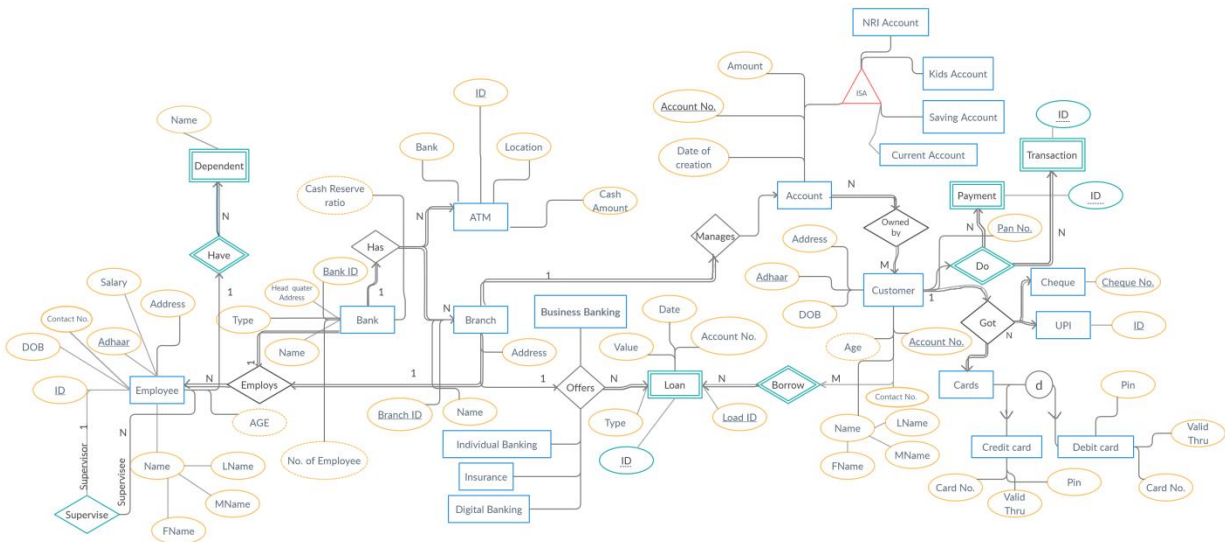
- (1) Select employee of a branch.
- (2) Select all customer having a branch “X” as a home branch.
- (3) All loans given by branch.
- (4) All transaction through an account.

h) ANALYSIS :-

- (1) List all services & accounts & loan connected or linked to an aadhar or account, or customer or card.
- (2) Detailed tabular list (including account no., name, DOB etc.) of customer who have not paid there loan.
- (3) Detailed tabular list of employees having account in the Bank.

⇒ Other left stuff –

ER – Diagram of the Project :-



⇒ CARDINALITY & (min/max):-

(1) A bank will have at least one branch or may have no branch (newly opened bank) there's no limit on number of branches a bank can have but on other hand a branch will have exactly one bank. So Cardinality = (1: N).

(2) An ATM comes under exactly one bank and but bank can have as many ATM's as needed. So Cardinality = (1: N).

(3) Bank/branch had to employ at least one employee & there's no limit on number of employee working for a bank but employee can only work for one branch/bank. So Cardinality = (1: N).

(4) An employee works under only one supervisor there can't be more than one supervisor but a supervisor will supervise more than one employees. So Cardinality = (1: N).

(5) Employees can have any number of dependent (weak entity) and dependent can only be related to exactly one employee. So Cardinality = (1: N).

(6) An account is managed by a single branch but on the other hand branch can handle any number of accounts. So Cardinality = (1: N).

(7) Account can be created by one or more customers (joint account) and similarly a customer can have more than one account. So Cardinality = (M: N).

(8) Customer can do any number of transactions/payments (weak entity) but transaction/payment can be done by only one customer. So Cardinality = (M: N).

(9) A Customer can get more than one UPI/cheque/cards (credit cards, debit cards) and UPI/cheque/cards have only one owner. So Cardinality = (1: N).

(11) A branch can offer any number of loans but one particular loan can be offered by only one branch. So Cardinality = (1: N).

(12) Customer can borrow any number of loans (weak entity) similarly loan can be borrowed by combined customers forming a group like different societies etc. So Cardinality = (1: N).