AIT-524-002

Database Management Systems

SUJAN CHAVA

George Mason University

- **Description of the company:**
  The database that I am planning to develop is a banking system to sanction loans for its customers. The bank want to store the data about all the branches for this bank, its accounts and loans sanctioned for the customers.
- **Why company needs database?**
  This banking system needs a database because, there will be huge number of customers for a bank at each specific branches. The bank needs to keep track of these customers at each branch, so that it will be easy for them to process customer's request. Also, the database can help them identify pending requests that they need to address and the requests they have already addressed. They can also, query out the total amount of loan taken by each customer.
- **Business Rules:**
  1) Each branch may issue any number of loans. Each loan must be issued by only one branch.
  2) Each branch may have many accounts. Each account must belong to only one branch.
  3) Each person may have any number of accounts. Each account must belong to only one specific person.
  4) Each person may borrow any number of loans. Each loan is sanctioned to only one person.
- **Description of entities and attributes:**
  1) Branches →The purpose of this entity is to store details of the branches that a bank have, its name and addresses.
  Attributes:
  branch_id, branch_name, branch_zip, branch_strtname, branch_city, branch_state
  2) Loans → Its purpose is to store details about amount sanctioned to each person.
  Attributes:
  loan_id, loan_type, loan_amount, loan_status, loan_assets
  3) Account → Its purpose is to store the account details of the customers of the bank.
  Attributes:
  accnt_num, accnt_type, accnt_balance
  4) Person → Its purpose is to store the details of the persons who have borrowed loan from banks and who have accounts in the banks.
  Attributes:
  person_id, person_name, person_phn, person_hno, person_strtname, person_city, person_state.
- **Description of relationship between the entities:**
  From the given business rules, we can say that
  1) **Branches and Loans:**
  There is a 1: M relationship between branches and loans because a branch can issue any number of loans, i.e (M) on loans side, but a loan is issued by only one branch, i.e (1) on branch side. It is a strong relationship as loans are dependent on branch. The relationship is optional on "many" (loans) side because the business rules says that each branch "may" issue any number of loans. It is mandatory on "one" (branches) side because business rules says that each loan "must" be issued by only one branch. Therefore according to the

business rules the cardinality on many side is (0, M) because it is optional and (1, 1) for the one side because it is mandatory.

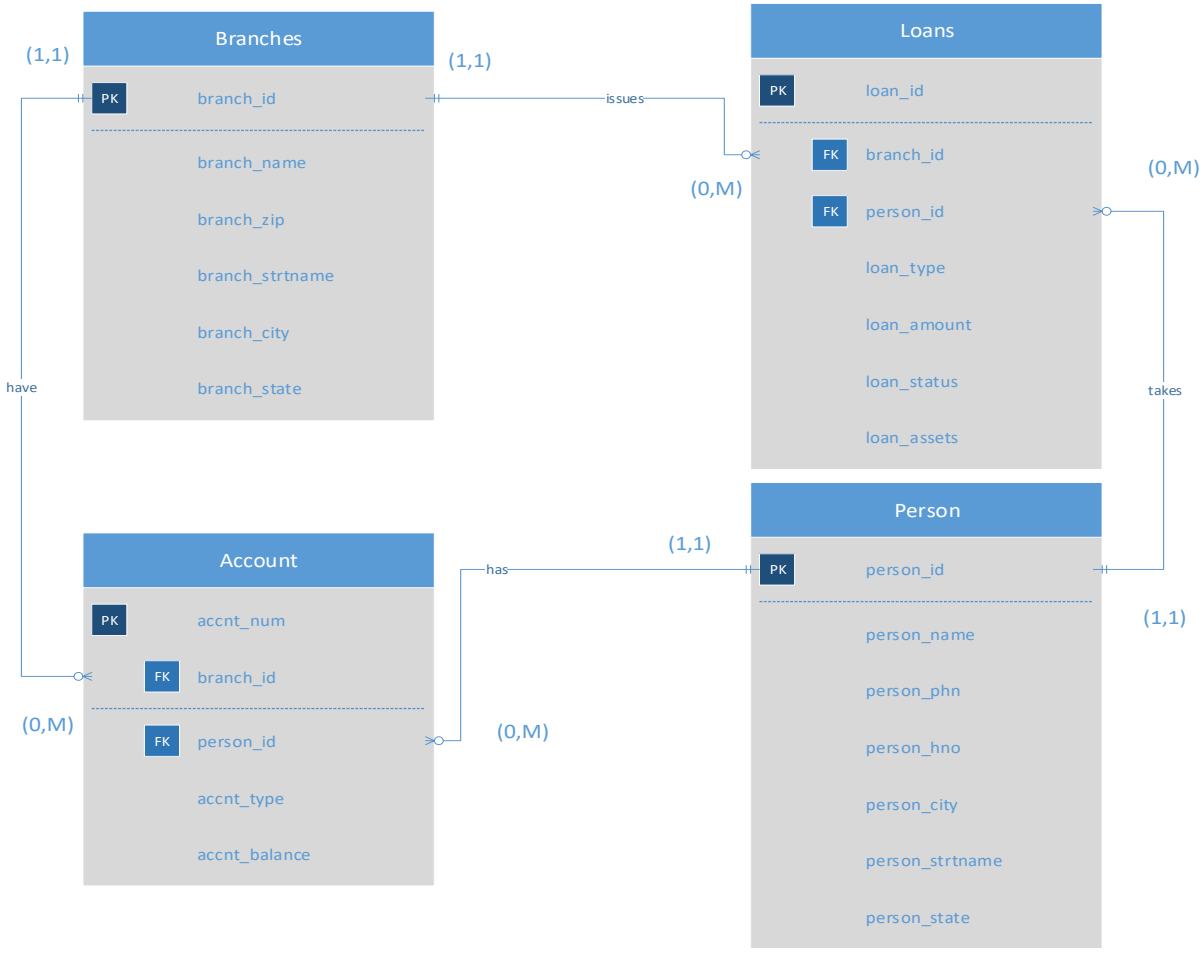
2) **Branches and Accounts:**
There is a 1: M relationship between branches and accounts because a branch can have any number of accounts, i.e (M) on accounts side, but an account belongs to only one branch, i.e (1) on branch side. It is strong relationship as accounts cannot exist without branches (bank) i.e accounts is dependent on branch. The relationship is optional on "many" (accounts) side because the business rules says that each branch "may" have many accounts. It is mandatory on "one" (branches) side because business rules says that each account "must" belong to only one branch. Therefore according to the business rules the cardinality on many side is (0, M) because it is optional and (1, 1) for one side because it is mandatory.

3) **Person and Accounts:**
There is a 1: M relationship between person and accounts because given a person can have any number of accounts, i.e (M) on accounts side, and an account belongs to only one person, i.e (1) on person side. It is strong relationship as accounts cannot exist without person i.e accounts is dependent on person. The relationship is optional on "accounts" side because the business rules says that each person "may" have an account. It is mandatory on person side because business rules says that each account "must" belong to one specific person. Therefore according to the business rules the cardinality on accounts side is (0, M) because it is optional and (1, 1) on person side because it is mandatory.

4) **Person and Loans:**
There is a 1: M relationship between person and loan because a person can borrow any number of loans, i.e (M) on loans side, but loan is issued to only one person, i.e (1) on person side. It is strong relationship as loan cannot exist without person i.e loan is dependent on person. The relationship is optional on "many" (loans) side because the business rules says that each person "may" take any number of loans. It is mandatory on "one" (person) side because business rules says that each loan "must" be sanctioned to only one person. Therefore according to the business rules the cardinality on many side is (0, M) because it is optional and (1, 1) for one side because it is mandatory.

The ERD using above business rules is designed using Microsoft Visio and the final ER-Diagram for our database is shown in the figure below.

ER- Diagram:


Branches
PK
branch_id
branch_name
branch_zip
branch_strtname
branch_city
branch_state
(1,1)
(1,1)
issues
Loans
PK
loan_id
FK
branch_id
FK
person_id
loan_type
loan_amount
loan_status
loan_assets
(0,M)
(0,M)
takes
have
Account
PK
accnt_num
FK
branch_id
FK
person_id
accnt_type
accnt_balance
(0,M)
(0,M)
has
(1,1)
Person
PK
person_id
person_name
person_phn
person_hno
person_city
person_strtname
person_state
(1,1)