CSE 5330 Database Systems

Database for a Bank Enterprise

Prof.Dr. Ranjan Dash

By:
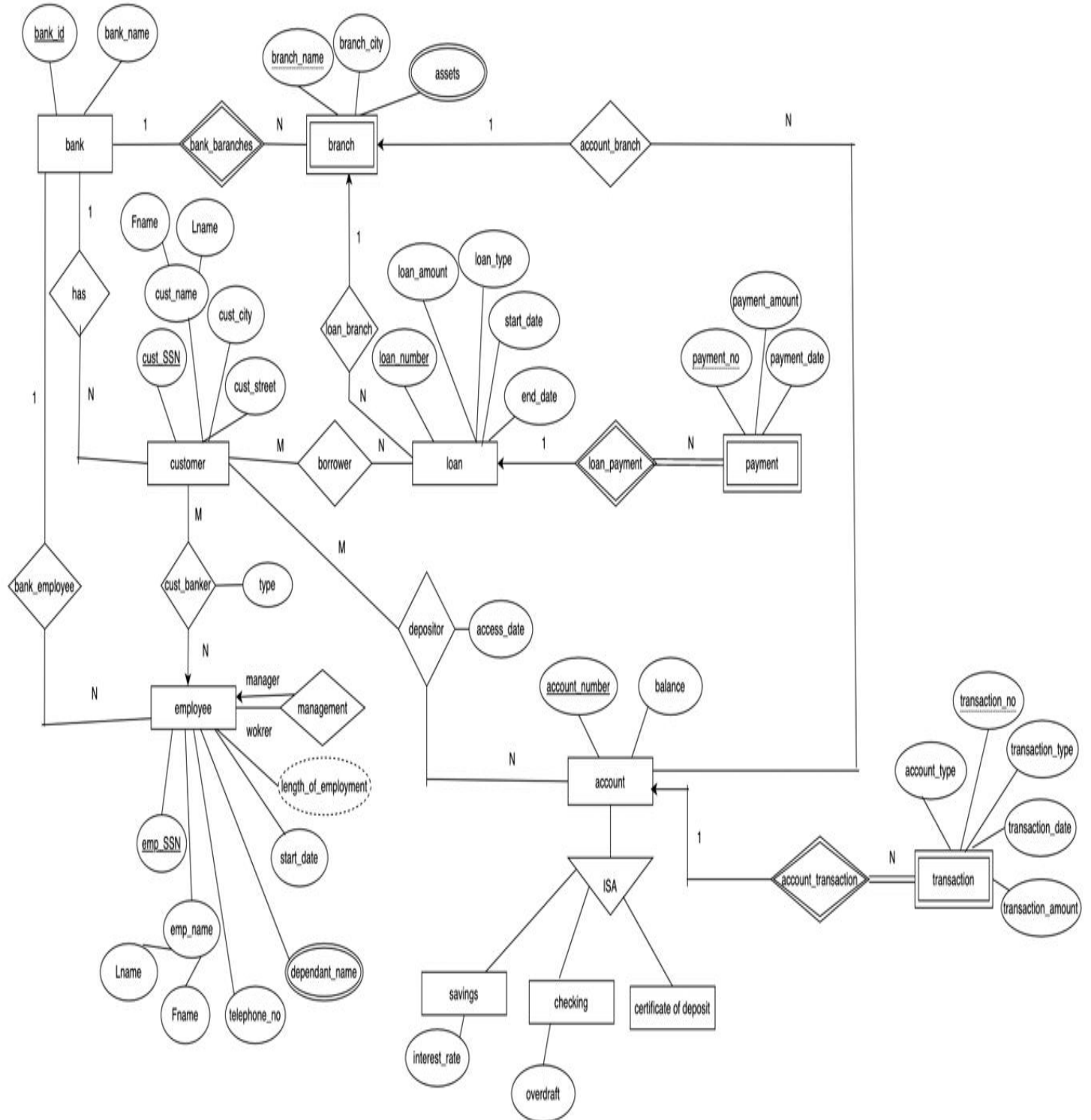Pranali Sanjay Khose
Student id :1002027459

EER Diagram

Fig 1.1

bank_id   bank_name   branch_name   branch_city   assets

bank — 1 — bank_baranches — N — branch — 1 — account_branch — N

Fname   Lname

cust_name   cust_city

cust_SSN   cust_street

has

loan_amount   loan_type   start_date

loan_branch   loan_number   end_date

payment_amount

payment_no   payment_date

customer — M — borrower — N — loan — 1 — loan_payment — N — payment

cust_banker — type

depositor — access_date

account_number   balance

transaction_no

transaction_type

account_type

bank_employee

manager — management — wokrer

length_of_employment

employee

emp_SSN   start_date

emp_name

Lname   Fname   telephone_no   dependant_name

account

ISA

savings   checking   certificate of deposit

interest_rate

overdraft

account_transaction — N — transaction

transaction_date

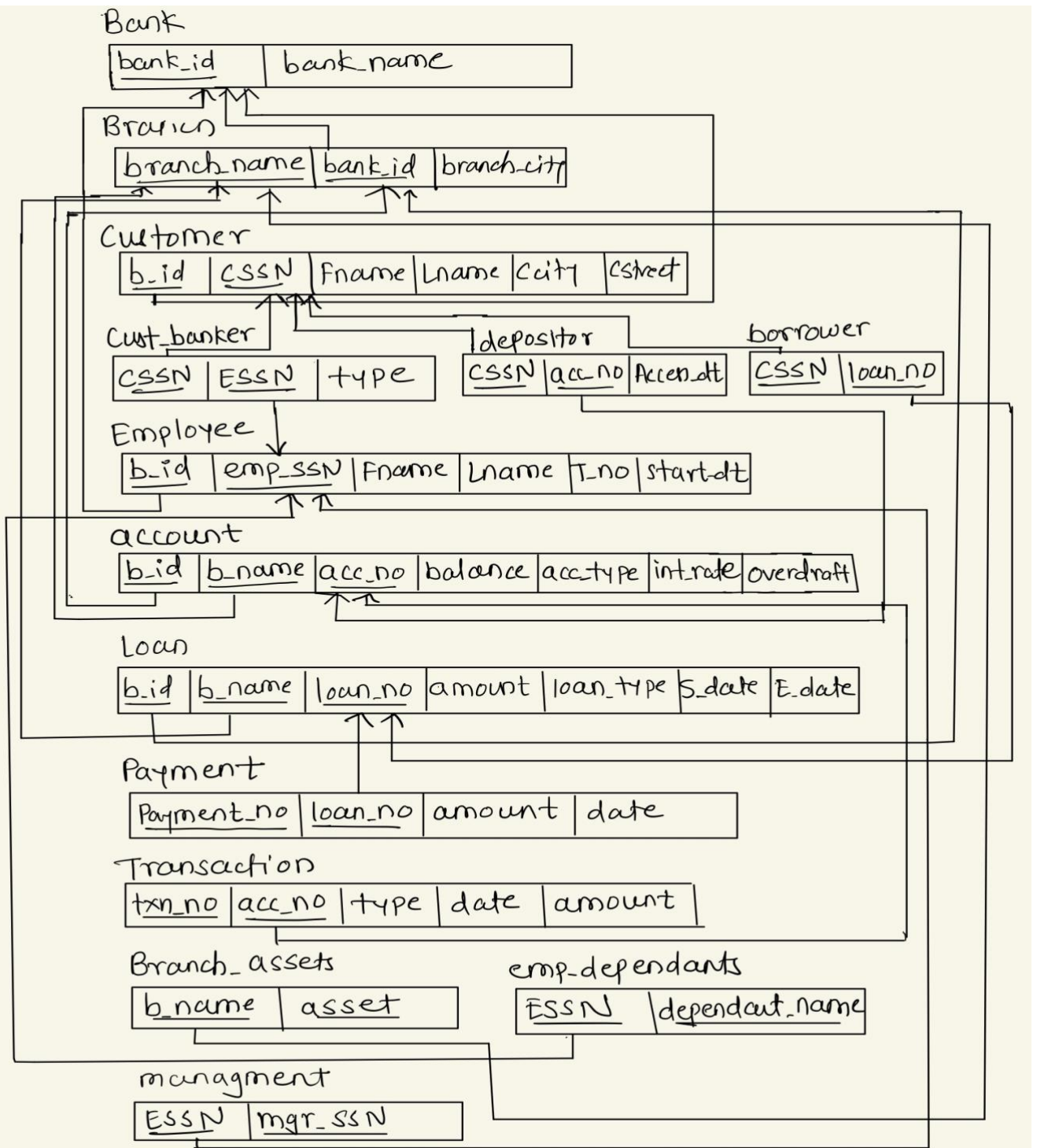transaction_amount

EER diagram explanation

As per requirements:

- There is total 5 strong entities i.e. bank, customer, loan,employee and account and 3 weak entities i.e. branch, transaction, payment.
- Branch is fully dependent on bank, hence created weak entity for the branch and bank can have multiple branches hence 1: N relation mapping.
- A customer can be a borrower and depositor, hence created M: N mapping with loan and account entities respectively.
- Multiple loans and accounts are managed by branch hence created 1: N with branch.
- Transaction and payment are weak entities depends on account and loan respectively and created 1: N relation mapping.
- Added specialization for account type with superclass as account and saving, checking and certificate of deposit as subclasses.
- Length of employment is a derived attribute from employee start date.

Assumptions:
- A branch can have multiple assets hence assets is a multivalued attribute.
- An employee can have multiple dependents hence dependant_name is a multivalued attribute.
- Credit card is a one type of loan; hence account types can be savings, checking and certificate of deposit.

Relational Schema Diagram

Fig 1.2

Bank

bank_id	bank_name

Branch

branch_name	bank_id	branch_city

Customer

b_id	CSSN	Fname	Lname	Ccity	Cstreet

Cust_banker

CSSN	ESSN	type

depositor

CSSN	acc_no	Accen_dt

borrower

CSSN	loan_no

Employee

b_id	emp_SSN	Fname	Lname	T_no	start_dt

account

b_id	b_name	acc_no	balance	acc_type	int_rate	overdraft

Loan

b_id	b_name	loan_no	amount	loan_type	S_date	E_date

Payment

Payment_no	loan_no	amount	date

Transaction

txn_no	acc_no	type	date	amount

Branch_assets

b_name	asset

emp-dependants

ESSN	dependant_name

managment

ESSN	mgr_SSN

Relational Schema Explanation

Referred EER diagram (fig 1.1) to design database schema.

- Step 1: Mapping of regular entity types.
  Created relations for bank, customer, employee, account, loan

Relation	PK
bank	bank_id
customer	CSSN
employee	emp_SSN
account	acc_no
loan	loan_no

- Step 2: Mapping of weak entity types.
  Created relations for branch, payment, and transaction and assigned partial key and parent entity together as primary key.

Relation	PK
branch	bank_id,branch_name
payment	Payment_no,loan_no
transaction	Txn_no,acc_no

- Step 3: Mapping of 1:1 relation types: There is no 1:1 relation in above EER.
- Step 4: Mapping of binary 1: N relation types: Added primary key of 1 side to N side.

Relation	PK
branch	bank_id,branch_name
customer	CSSN, bank_id
employee	emp_SSN,bank_id
account	acc_no, bank_id, branch_name
loan	loan_no,bank_id,branch_name
payment	Payment_no,loan_no
transaction	Txn_no,acc_no

- Step 5: Mapping of binary M: N relation types: Creation of new relation with primary keys from both side of relations.

Relation	PK
borrower	CSSN,loan_no
Cust_banker	CSSN, emp_SSN
depositor	CSSN,acc_no

- Step 6: Mapping of multivalued attribute.: Created new relation and added parent entity primary key.

Relation	PK
Branch_assets	branch_name,asset
Emp_dependant	ESSN,dependant_name

- Step 7: There is no N-ary relations in EER.
- Step 8: Mapping of specialization.: We have a account type specialization hence added acc_type flag in account table and all remaining. attributes to account.

Below are the total relations and their primary and foreign keys.:

Relation	PK	FK
bank	bank_id	
branch	branch_name,bank_id	bank_id
employee	emp_SSN,bank_id	bank_id
management	emp_SSN	emp_SSN, mgr_ssn
account	account_no,branch_name,bank_id	branch_name,bank_id
customer	cust_SSN,bank_id	bank_id
loan	loan_no,branch_name,bank_id	branch_name,bank_id
payment	loan_no,payment_no	loan_no
transaction	transaction_no,account_no	account_no

cust_banker	cust_SSN,emp_SSN	cust_SSN, emp_SSN
depositor	cust_SSN,account_no	cust_SSN, account_no
borrower	cust_SSN,loan_no	cust_SSN, loan_no
branch_assets	branch_name,asset	branch_name
emp_dependant	emp_SSN,dependant_name	emp_SSN