DB HW2

3200105872 庄毅非

2.7 Consider the bank database of Figure 2.18. give an expression in the relational algebra for each of the following queries

a. Find the name of each branch located in "Chicago".
Answer:

$$\Pi_{branch\_name}(\sigma_{branch\_city='Chicago'}(branch))$$

b. Find the ID of each borrower who has a loan in branch "Downtown"
Answer:

$$\Pi_{ID}(\sigma_{branch\_name='Downtown'}(loan \underset{loan.loan\_number=borrower.loan\_number}{\bowtie} borrower))$$

2.12 Consider the bank database of Figure 2.18. Assume that branch names and customer names uniquely identidy branches and customers, but loans and accounts can be associated with more than one customer.

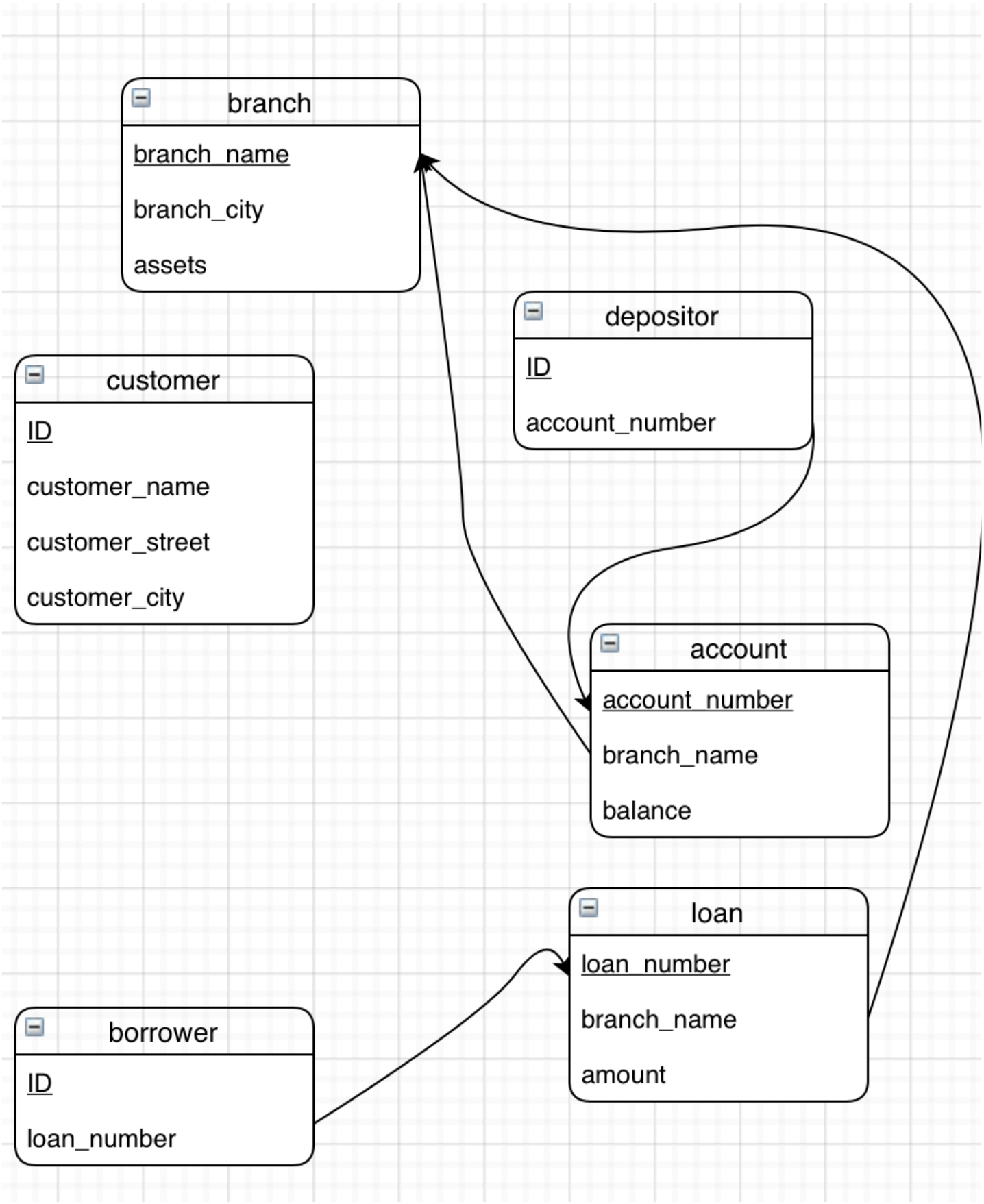
a. What are the appropriate primary keys?
Answer:

table	primary key
branch	branch_name
customer	ID (or customer name)
loan	loan_number
borrower	ID
account	account_number
depositor	ID

b. Given your choice of primary keys, identify appropriate foreign keys.
Answer:
branch_name in loan is the foreign key of branch_name in table 'branch'.
loan_number in borrower is the foreign key of loan_number in table 'loan'.
branch_name in account is the foreign key of branch_name in table 'branch'
account_number in depositor is the foreign key of account_number in table 'account'.

2.13 Construct a schema diagram for the bank database of Figure 2.18.

Answer:


branch
branch_name
branch_city
assets
depositor
ID
account_number
customer
ID
customer_name
customer_street
customer_city
account
account_number
branch_name
balance
loan
loan_number
branch_name
amount
borrower
ID
loan_number

2.15 Consider the bank database of Figure 2.18. Give an expression in the relational algebra for each of the following queries:

1. Find each loan number with a loan amount greater than $10000.

Answer:

$$\Pi_{loan\_number}(\sigma_{amount>10000}(loan))$$

2. Find the ID of each depositor who has an account with a balance greater than $6000.

Answer:

$$\Pi_{ID}(\sigma_{balance>6000}(depositor \underset{depositor.account\_number=account.account\_number}{\bowtie} account))$$

3. Find the ID of each depositor who has an account with a balance greater than $6000 at the “Uptown” branch.

Answer:

$$\Pi_{ID}(\sigma_{balance>6000 \wedge branch\_name='Uptown'}(depositor \underset{depositor.account\_number=account.account\_number}{\bowtie} account))$$