

- 2.1

employee: person_name

works: person_name, company_name

company: company_name

- 2.2

instructor 表插入记录, dept_name 列的值在 department 表没有对应的记录;

在 department 表删除记录, 但对应记录的主键被 instructor 表的记录引用。

- 2.6 不是。

(s_id, i_id) 组成主键

- 2.7

– a

主键:

branch : branch_name

customer : ID

loan: loan_number

borrower: ID, loan_number

account: account_number

depositor: ID

– b

外键:

loan.branch_name 参考 branch

borrower.id 参考 customer

borrower.loan_number 参考 loan

account.branch_name 参考 branch

depositor.id 参考 customer

depositor.account_number 参考 account

- 2.8

如图 1 所示。

- 2.9

1. 表示暂时未知的值; 2. 外连时, 没有匹配的行的外连关系的值为空值。

- 6.2

– a

$\Pi_{person_name}(\sigma_{city='Miami'}(employee))$

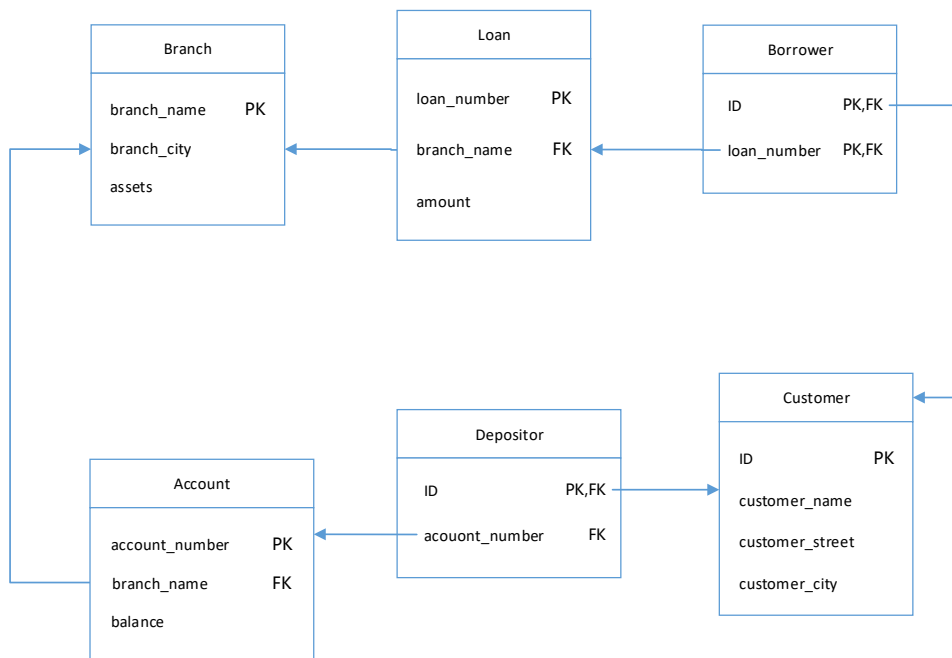


图 1: 银行数据库模型图

– b

$$\Pi_{person_name}(\sigma_{salary > 100000}(works))$$

– c

$$\Pi_{person_name}(\sigma_{city = 'Miami' \text{ and } salary > 10000}(employee \bowtie_{employee.person_name = works.person_name} works))$$

• 6.3

– a

$$\Pi_{branch_name}(\sigma_{branch_city = 'Chicago'}(branch))$$

– b

$$\Pi_{customer_name}(\sigma_{branch_name = 'Downtown'}(borrower \bowtie_{borrower.loan_number = loan.loan_number} loan))$$

• 6.4

– a

$$\Pi_{person_name}(employee) - \Pi_{person_name}(\sigma_{company_name = 'BigBank'}(employee \bowtie_{employee.person_name = works.person_name} works))$$

– b

$$\Pi_{person_name}(\rho_a(works) \bowtie_{a.salary = b.salary \wedge a.person_name \neq b.person_name} \rho_b(works))$$

• 6.10

– a

$$\Pi_{person_name}(\sigma_{company_name = 'BigBank'}(works))$$

– b

$$\Pi_{person_name, city}(\sigma_{company_name='BigBank'}(employee \bowtie_{employee.person_name=works.person_name} works))$$

– c

$$\Pi_{person_name, city, street}(\sigma_{company_name='BigBank' \wedge salary > 10000}(employee) \bowtie_{employee.person_name=works.person_name} works)$$

• 6.11

– a

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

– b

$$\Pi_{customer_name}(\sigma_{amount > 6000}(account) \bowtie_{account.account_number=depositor.account_number} depositor)$$

– c

$$\Pi_{customer_name}(\sigma_{amount > 6000 \wedge branch_name='Uptown'}(account) \bowtie_{account.account_number=depositor.account_number} depositor)$$

• 6.12

– a

$$\Pi_{id, name}(\sigma_{dept_name='Physics'}(instructor))$$

– b

$$\Pi_{id, name}(instructor \bowtie_{instructor.dept_name=department.dept_name} \sigma_{building='Watson'}(department))$$

– c

$$\Pi_{id, name}(\sigma_{dept_name='Comp.Sci.'}course \bowtie_{course.course_id=takes.course_id} takes \bowtie_{takes.id=student.id} student)$$