國立東華大學試題：資料庫管理

資訊管理學系2007.5.1

Example: Banking Database

1. branch 分公司

branch-name	branch-city	assets
Brighton	Brooklyn	7100000
Downtown	Brooklyn	9000000
Mianus	Horseneck	400000
North Town	Rye	3700000
Perryridge	Horseneck	1700000
Pownal	Bennington	300000
Redwood	Palo Alto	2100000
Round Hill	Horseneck	8000000

2. customer 客戶(存款戶,貸款戶)

customer-name	customer-street	customer-city
Adams	Spring	Pittsfield
Brooks	Senator	Brooklyn
Curry	North	Rye
Glenn	Sand Hill	Woodside
Green	Walnut	Stamford
Hayes	Main	Harrison
Johnson	Alma	Palo Alto
Jones	Main	Harrison
Lindsay	Park	Pittsfield
Smith	North	Rye
Turner	Putnam	Stamford
Williams	Nassau	Princeton

3. depositor 存款戶

customer-name	account-number
Hayes	A-102
Johnson	A-101
Johnson	A-201
Jones	A-217
Lindsay	A-222
Smith	A-215
Turner	A-305

4. borrower 貸款戶

customer-name	loan-number
Adams	L-16
Curry	L-93
Hayes	L-15
Jackson	L-14
Jones	L-17
Smith	L-11
Smith	L-23
Williams	L-17

5. account 存款帳

account-number	branch-name	balance
A-101	Downtown	500
A-102	Perryridge	400
A-201	Brighton	900
A-215	Mianus	700
A-217	Brighton	750
A-222	Redwood	700
A-305	Round Hill	350

6. loan 貸款帳

loan-number	branch-name	amount
L-11	Round Hill	900
L-14	Downtown	1500
L-15	Perryridge	1500
L-16	Perryridge	1300
L-17	Downtown	1000
L-23	Redwood	2000
L-93	Mianus	500

Question 1: Database System vs. File System (25%)

- In the early days, database applications were built on top of file systems
- Drawbacks of using file systems to store data:

a) Data redundancy and inconsistency, why?

b) Difficulty in accessing data, why?

c) Integrity problems, why?

d) Security problems, why?

e) Database systems offer solutions to all the above problems, why?

Question 2: About Keys (18%)

a) Explain what is the **Superkey?**

b) List all possible superkeys from relation table ***account*** in the page 1.

c) Explain what is the **Candidate key?**

d) List all possible **Primary Key** from relation table ***account.***

e) Explain what is the **Foreign key?**

f) Refer to page 1, what attribute in ***account*** should define as a Foreign Key? Why?

5. account 存款帳

account-number	*branch-name*	*balance*
A-101	Downtown	500
A-102	Perryridge	400
A-201	Brighton	900
A-215	Mianus	700
A-217	Brighton	750
A-222	Redwood	700
A-305	Round Hill	350

Question 3: View (15%)

- Assume we have two queries: Q1 and Q2 as follows:
  - Q1. create view big-customer as
    (select account-number, branch-name
    from account
    where balance > 500
  - Q2 select *
    from big-customer

a) Draw the result of Q2

b) If we want to add a new tuple to big-customer

insert into big-customer values ('A-999', 'Hualien')

Where the insertion values will be placed? Draw a table to show your answer.

c) What are the advantages of the View?

Question 4: Relational-Algebra (18%)

- Relational-Algebra operators: The operators take one or more relations as inputs and give a new relation as a result.

a) Explain what is a “procedural language”?

b) Relational-Algebra is a procedure language or non-procedure?

- Draw a simple figure to show the following Relational-Algebra Operations

c) Select

d) Project

e) Cartesian product

f) Natural Join

Question 5: Fill in the following components to the Overall System Structure and explain them in details (24%)

1. Query Processor
2. Storage Manager
3. Database administrator
4. Application programmers
5. DDL interpreter
6. Compiler and Linker
7. Buffer manager
8. Data dictionary
9. Index
10. Data
11. Naïve users
12. Application programs