國 立 臺 北 科 技 大 學

九十七學年第二學期電機系博士班資格考試

資料庫試題(公告用)

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注意事項：

1. 本試題共【8】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間：二小時。

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1. Specify each of the following queries in both SQL and Relational Algebra. The queries are based on the following relational schema defined by SQL statements:

   create table employee (
      ssn char(9),
      name char(20),
      supervisor_ssn char(9),
      salary integer,
      dept_no integer,
      primary key (ssn),
      foreign key (supervisor_ssn) references
        employee(ssn),
      foreign key (dept_no) references
        department(dnum)
)

   create table department (
      dnum integer,
      dname char(20),
      manager_ssn char(9),
      city char(20),
      primary key (dnum),
      foreign key(manager_ssn) references
        employee(ssn)
)

   (a) (10%) Find the names of the employees and the cities in which they work.

   (b) (10%) Find the sum of salaries of all managers.

   (c) (10%) Find the names and salaries of the supervisors of the employees who earn more than \$30,000.

2. (10%) Give a set of functional dependencies for the relation schema R(A,B,C) with primary key AB under which R is in 3NF but not in BCNF.

3. (10%) Discuss why concurrency control is needed in transaction processing systems?

4. (10%) What is the two-phase locking protocol? What are some variations of the two-phase locking protocol?

5. (10%) How does a B-tree differ from a B^+-tree?

6. (10%) Discuss the problem of spurious tuples and how we may prevent it.

7. (10%) Consider the following hash index built using extensible hashing. Assume that each bucket can hold at most two data entries. <number>* represents a data entry with the hash value <number>. Show the hash index after the insertion of data entry 18*.
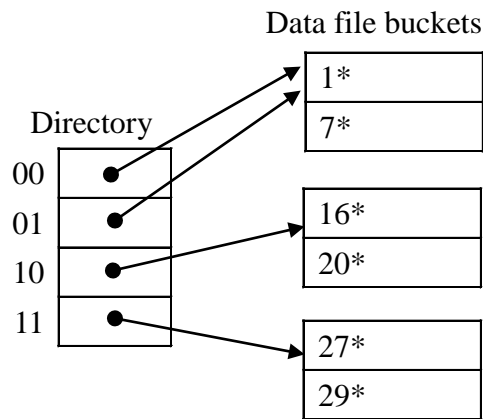
8. (10%) Design a relational database schema corresponding to the following E-R diagram. Remember to indicate the primary key of each relation schema and all referential-integrity constraints (foreign-key constraints) between the relation schemas