

# 臺中健康暨管理學院

## 九十二學年度碩士班暨碩士在職專班招生考試試題紙

系 所 別	組 別	考試科目	考試日期	時 間	備 註
生物資訊學系碩士班 生物資訊學系碩士在職專班	--	資料庫系統	92.3.30	13:30-15:10	共一頁

- I. A company database needs to store information about employees (identified by *ssn*, with *salary* and *phone* as attributes); departments (identified by *dno*, with *dname* and *budget* as attributes); and children of employees (with *name* and *age* as attributes). Employees *work* in departments; each department is *managed by* an employee; a child must be identified uniquely by *name* when the parent (who is an employee; assume that only *one* parent works for the company) is known. The company is not interested in information about a child once the parent leaves the company. Draw an ER diagram that captures this information. (10%)
- II. Suppose that we have a ternary relationship *R* between entity sets *A*, *B*, and *C* such that *A* has a key constraint and total participation, and *B* has a key constraint; these are the only constraints. *A* has attributes *a1* and *a2*, with *a1* being the key; *B* and *C* are similar. *R* has no descriptive attributes. Write SQL statements that create tables corresponding to this information so as to capture as many of that constraints as possible. If you cannot capture some constraint, explain why. (10%)
- III. Consider the following relations containing airline flight information. Note that the Employees relation describes pilots and other kinds of employees as well; every pilot is certified for some aircraft (otherwise, he/she would not qualify as a pilot), and only pilots are certified to fly. Write the following queries in relational algebra and SQL. (30%)
- Flight(*fno*: integer, *from*: string, *to*: string, *distance*: integer, *departure*: time, *arrival*: time)  
Aircraft(*aid*: integer, *aname*: string, *cruisingrange*: integer)  
Certified(*eid*: integer, *aid*: integer)  
Employees(*eid*: integer, *ename*: string, *salary*: integer)
1. Find the *eids* of pilots certified for some Boeing aircraft.
  2. Find the *aids* of all aircraft that can be used on non-stop flights from Bangkok to Detroit.
  3. Find the names of pilots who can operate planes with a range greater than 3,000 miles but are not certified on any Boeing aircraft.
- IV. Which of the three basic file organizations would you choose for a file where the most frequent operations are as follows? (15%)
1. Search for records based on a range of field values.
  2. Perform inserts and scans where the order of records does not matter.
  3. Search for a record based on a particular field value.
- V. Consider a relation *R* with five attributes *ABCDE*. You are now given the following dependencies:  $A \rightarrow B$ ,  $BC \rightarrow E$ , and  $ED \rightarrow A$ . (15%)
1. List all keys for *R*.
  2. Is *R* in 3NF? Why?
  3. Is *R* in BCNF? Why?
- VI. Consider a database with objects *X* and *Y*, and assume that there are two transactions *T*<sub>1</sub> and *T*<sub>2</sub>. Transaction *T*<sub>1</sub> reads objects *X* and *Y* and then writes object *X*. Transaction *T*<sub>2</sub> reads objects *X* and *Y* and then writes objects *X* and *Y*. (20%)
1. Give an example schedule with actions of transactions *T*<sub>1</sub> and *T*<sub>2</sub> on objects *X* and *Y* that results in a *write-read* conflict.
  2. Give an example schedule with actions of transactions *T*<sub>1</sub> and *T*<sub>2</sub> on objects *X* and *Y* that results in a *read-write* conflict.