北京交通大学　软件学院 2009 级

《Database System》期末考试试卷(A)（2011-06-20）

姓名_____学号_____班级_____ 任课老师_____

题号	一	二	三	四	五	六	总分
得分							

Write your solution in the specified place, otherwise invalid.

I. Single choice (10 points)

1. Relational Model, Network Model and Hierarchical Model belong to the (1)

(a) conceptual model (b) logical model

(c) physical model (d) E/R model

2. Which symbol is used in standard SQL as a wildcard to represent a series of zero or more unspecified characters? (2)

(a)? (question mark) (b)! (exclamation mark) (c)% (percent sign)

(d)_ (underscore) (e); (semi-colon)

3. When a transaction functions in such a way that either all of the transaction actions are completed or none of them will be, the transaction is said to be: (3)

(a)atomic. (b)logical. (c)isolated. (d)consistent. (e)locked.

4. The component of a database that describes the structure of the database is the: (4)

(a)related tables. (b)metadata. (c)related tuples. (d)data set. (e)library.

5. Which of the following is NOT true about primary keys? (5)

(a) Primary keys must be unique.

(b) Primary keys can be defined using a SQL CONSTRAINT phrase.

(c) Primary keys must be a single attribute.

(d) Primary keys are used to represent relationships.

(e) Primary keys cannot be null.

6. If all concurrent transactions follow 2PL protocol, they must be serializable.

Is it true? (6)

(a) Maybe (b) No (c) not sure (d) Yes

7. A point of synchronization between the database and the transaction log is called a(n) (7)

(a) after-image. (b) recovery. (c) checkpoint. (d) before-image.

8. During the normalization process, the remedy for a relation that is not well formed is to (8)

(a) decompose it into two or more relations that are well formed.
(b) combine it with another relation that is well formed.
(c) convert it into a list.
(d) create a functional dependency.
(e) create a surrogate key.

9. Which type of join, although not included in standard SQL, was created to allow unmatched rows to appear in the result of a join operation? (9)
(a) OPEN JOIN (b) INNER JOIN (c) OUTER JOIN (d) COMBINE JOIN

10. Which of the following is true when representing a 1:1 binary relationship using the relational model? (10)
(a) The key of the entity with the most attributes must be placed in the other entity as a foreign key.
(b) The key of the entity with the highest minimum cardinality must be placed in the other entity as a foreign key.
(c) The key of each entity must be placed in the other as a foreign key
(d) The key of the entity being searched less frequently is placed in the other entity as a foreign key.
(e) Both entities must have the same primary key.

Please write your solution for Question I in the following table, otherwise invalid.

No	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Answer										

II. Fill in the blanks (10 points)

1. Database integrity refers to the___(1)___ and ___(2)___ of stored data.
2. Among the three levels of schemas, __(3)__level is the "heart" of the database.
3. The physical data model is used to describe data at the ___(4)___ level.
4. Among the four levels of Transaction isolation defined in SQL-92, only the _(5)_ isolation level is safe, that is, not generating ___(6)___ or __(7)___ phenomena which maybe appear in other three levels.
5. Please give the names of three popular commercial DBMS dialects, i.e. ___(8)___ produced by Oracle company, ___(9)___ by Microsoft company and ___(10)___ by IBM company.

Please write your solution for Question II in the following table, otherwise invalid.

No.	(1)	(2)	(3)	(4)	(5)
answer					
No.	(6)	(7)	(8)	(9)	(10)
answer					

III. (30 points) There are 3 relation schemas in Database STUDENT, which are as follows.

S (sno, sname, age, sex, Total_credits) <PK>=sno,
where Total_credits is the sum of the credits of all courses which the student has chosen.
C (cno, cname, credit, teacherNo) <PK>=cno
SC (sno,cno,grade) <PK>=(sno, cno) , <FK>=sno, <FK>=cno

1. **(3 points)** Delete the attribute named 'teacherNo' from Talbe C.

2. **(7 points)** Write a stored procedure that shows all students having choosen all courses that a certain student given by his/her student number (@given_sno) chooses, list such students' name, the number of all courses which he or she chooses, and the average grade and the total credits.

3. **(5 points)** For all female students, create a view that list her student number, name, the number of all courses which she chooses and the average grade that is more than 85. In addition, **it prohibits a row migrating out of the view.**

4. **(5 points)** In Table SC, list all female students' tuples in which the grades are greater than all grades that student 's1' (a value of sno) earned.

5. **(5 points)** List the student numbers of all the students who do not choose 'c2' and 'c4' (the value of cno) simultaneously. (Write relational algebra expression)

6. (5 points) Design one trigger that can prevent a student from choosing more than three courses when a inserting or updating the information in Table SC.

IV. （**10 points**）**Specify all candidate keys of each relation and the highest level normal formal to which the following relations belong. Please write your reasons, and decompose it into a BCNF set if it is not in BCNF.**

1. R1 (A, B, C) , F1={(A,C)→B, B→C}

2. R2 (A,B,C,D), F2={D→A,D→B}

V. (20 points) Please answer the following questions briefly.

1. **(4 points)** Please write the four levels of Transaction isolation defined in SQL-92 or defined by a certain commercial DBMS after giving the name of the DBMS.

2. (6 points) Please fill in the following blanks.

3. **(5 points)** What is the function of Locks? What are the functions of S-lock and X-lock respectively? If the two kinds of lock have alias, please write all of them.

4. **(5 points)** Distinguish between the HAVING clause and the WHERE clause. When both the WHERE clause and the HAVING clause appear in the same SELECT statement, which clause is generally executed first?

VI. (20 points) Suppose that you are asked to design a database for a specific bank which has many branches.

(1) One branch owns many accounts and one account can only belong to one branch.

(2) One customer can own many accounts, but one account can only belong to one customer.

(3) A branch can loan money to customers. One customer can borrow several loans from the bank and one loan can have several debtors, i.e. customers.

In addition, the database should also include the following information.

(1) The individual information of every customer, such as customer name, address and cell-phone-number. Suppose each person has only one cell phone number.

(2) The detail information of each branch, such as the branch number, address and assets.

(3) The information of a loan, such as loan-number, branch-number and amount.

(4) The information of an account, such as account-number, branch-number and balance.

Please draw the ER-diagram for the application, **leaving the attributes out of the diagram**, and write the set of relation schemas with attributes. Then point out the primary key of each relation schema and foreign keys if it has.