

# 诚信考试      沉着应考      杜绝违纪

浙江大学 2008–2009 学年 春 季学期

## 《 数据库系统原理 》课程期末考试试卷

开课学院： 计算机学院 ， 考试形式： 闭卷， 允许带一张含内容 A4 纸入场

考试时间： 2009 年 4 月 13 日， 所需时间： 120 分钟， 任课教师                     

考生姓名：                      学号：                      专业：                     

题序	一	二	三	四	五	六	总分
得分							
评卷人							

### 1. Relational Algebra (10 points, 5 points each)

Consider the following relational schemas:

Employee (id, name, age, gender)

EmpSkill(id, skill)

JobSkill (job, skill)

Following are instances of these relations:

**Employee:**

id	name	age	gender
E01	John	20	M
E02	Mean	22	F
E03	Smith	24	M
E04	David	30	M
E05	Mary	18	F

**EmpSkill:**

id	skill
E01	Java
E01	C++
E02	C++
E03	TEST
E04	Finance

**JobSkill:**

job	skill
DEV	Java
DEV	C++
BA	FX
BA	Equity

UAT	C++
UAT	Finance

In addition, we define that “*an employee fits a job*” if and only if the employee has all skills that are needed by the job.

Please write relational algebra expressions for the following queries.

- 1) Find the name of female employees who have at least one skill needed by the “DEV” job.
- 2) Find the names of employees who fit the “DEV” job.

## 2. SQL Query (20 points, 5 points each)

Consider the relational schemas given in **problem 1**, please write SQL statements to meet the following requests.

- 1) Find the employees who have not any skills.
- 2) Find the jobs that need at least “Java” and “C++” skills.
- 3) Find the names of employees who have the maximum number of skills among all employees.
- 4) Find the employees who fit both the “DEV” and “UAT” jobs.

## 3. Embedded SQL (10 points)

Based on the schemas defined in **problem 1**, the following embedded SQL program accepts the id of an employee as input , and output all skills of the employee. Please fill in the blanks of the program.

```
main( )
{
    EXEC SQL INCLUDE SQLCA;
    EXEC SQL BEGIN DECLARE SECTION;
    char id[10]; char skill [20];
    EXEC SQL END DECLARE SECTION;
    EXEC SQL CONNECT TO skill_db USER use1 USING password1;
    EXEC SQL DECLARE skill_cursor CURSOR for _____ ① _____;
    printf(“please input employee id :”);
    scanf (“%s”, id);
    EXEC SQL _____ ② _____;
    for (; )
    {
        EXEC SQL _____ ③ _____;
        if ( _____ ④ _____ ) break;
        printf( “%s\ n”, id);
    }
}
```

EXEC SQL \_\_\_\_\_⑤\_\_\_\_\_;

}

#### 4. E-R Model (20 Points, 10 points each)

A publishing company needs to use database to store paper reviewing information. Each paper is identified by *pid*, with *title*, *author names*, *abstract*, *key words*, *status*, *received date*, and *accepted date* as attributes; Authors and readers are all identified by *email account*, with *name*, *birthday*, *phone*, *address*, and *organization* as attributes; Readers are additionally described by *technical title*, *research area*, and *state*; Each paper is written by a couple of authors and reviewed by several readers. Each reader gives *remark* and *advice* (accepted or not accepted) for the paper that he reviews.

- 1) Draw an ER diagram that captures this information.
- 2) Please transform the ER diagram of 1) into a set of formalized relational schemas.

#### 5. Relational Formalization (20 points, 5 points each)

Consider relational schema R (id, name, age, college, location, phone, building, dorm, teacher, title, year, ) with functional dependencies set

$F = \{id \rightarrow name; id \rightarrow age; id \rightarrow college; college \rightarrow location; college \rightarrow phone; id \rightarrow dorm; dorm \rightarrow building; teacher \rightarrow title\}$ ,

Please answer the following questions:

- 1) List all candidate keys for the relation schema R.
- 2) Identify whether R is in BCNF or 3NF or neither.
- 3) If R is not in BCNF, decompose R into a collection of BCNF relations. The decomposition must be lossless-join. Show each step of the decomposition.
- 4) Is the above decomposition dependency preserving? Why?

#### 6. XML (20 points, 5 points each)

Consider the following XML document containing research project information.

<research>

<project pid="p01" manager="d001" members="d001 d002">

<pname>Native XML Database</pname>

<budget>100</budget>

<from>2008-01-01</from>

<to>2008-12-01</to>

</project>

<project pid="p02" manager="d003" members="d003 d002 ">

```

    <pname>Unstructured Data Management</pname>
    <budget>4000</budget>
    <from>2009-01-01</from>
    <to>2010-12-01</to>
</project>
<developer did="d001">
    <dname>Xiao Zhao</dname>
    <age>30</age>
</developer>
<developer did="d002">
    <dname>Xiao Qian</dname>
    <age>20</age>
</developer>
<developer did="d003">
    <dname>Xiao Sun</dname>
    <age>25</age>
</developer>
</research>

```

- 1) Give relational schemas that can store the data contained in the XML documents like the one above.
- 2) Write an XML DTD that the document above conforms.
- 3) Write the result of the following XPath expression on the document above.  
`/research/developer[age>20]/dname/text()`
- 4) Write the result of the following XQuery statement on the document above.
 

```

for    $p in /research/project,
        $d in /research/developer
where  $p/@manager = $d/@did and $d/age <30
return <talent> { $d/dname $p/pname }</talent>

```