# CS585

Database Systems

Summer 2006

Midterm Exam

Name: _____

Student ID: _____

| | Maximum | Received |
|---|---|---|
| Problem 1 | 15 | |
| Problem 2 | 30 | |
| Problem 3 | 20 | |
| Problem 4 | 20 | |
| Problem 5 | 15 | |

1) 15 pts
Briefly answer the following questions:

- Name 4 key advantages in managing data thru a database system over managing data thru the operating system.

- What advantage does an R+ tree have over an R tree?

- Give an example of how function overloading can simplify query writing in an ORDBMS.

- Give an example of how function overriding can simplify query writing in an ORDBMS.

2) 30 pts

The Student database has three tables. The Students table holds information about students. The Offerings table has information about an offering of a course for a particular semester/year. Semester can contain 3 values – Fall, Spring , Summer. St_Reg table contains information on which student has registered for what course and the grade he has obtained

**Offerings**

| Column Name | Type | Integrity constraint |
|---|---|---|
| CourseDept | varchar(3) | PK |
| CourseCode | varchar(3) | PK |
| CourseSection | varchar(3) | PK |
| YearOffered | varchar(4) | PK |
| Semester | varchar(10) | PK |
| CourseTitle | varchar(100) | |
| InstructorID | varchar(10) | |

**St_Reg**

| Column Name | Type | Integrity constraint |
|---|---|---|
| SID | varchar(10) | PK, FK ref. Students |
| CourseDept | varchar(3) | PK, FK ref Offerings |
| CourseCode | varchar(3) | PK, FK ref Offerings |
| CourseSection | varchar(3) | PK, FK ref Offerings |
| YearOffered | varchar(4) | PK, FK ref Offerings |
| Semester | varchar(10) | PK, FK ref Offerings |
| LetterGrade | varchar(2) | |

**Students**

| Column Name | Type | Integrity constraint |
|---|---|---|
| SID | varchar(10) | PK |
| Fname | varchar(50) | |
| Lname | Varchar(50) | |
| Address | Varchar(100 | |
| City | varchar(50) | |
| State | varchar(50) | |
| ZIP | varchar(5) | |

Using the information given on the previous page write the following queries in SQL

a. What courses did ‘Sam Fisher’ take?

b. Get the names of the courses that were offered in 2004

c. Get the names of students who got an A in all the courses they have taken

d. Get the total number of courses that were ever offered

e. Which courses have more than one section in 2004

f. What is the enrollment for CS 585 001

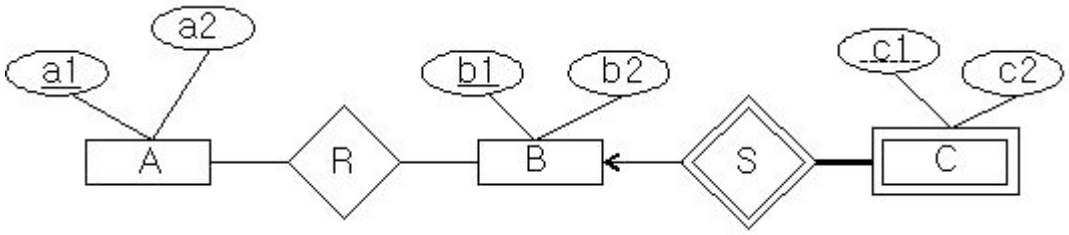
g. Get the names of students who enrolled for CS 585 001

h. Get instructor Id's and the total number of students they have ever taught in descending order

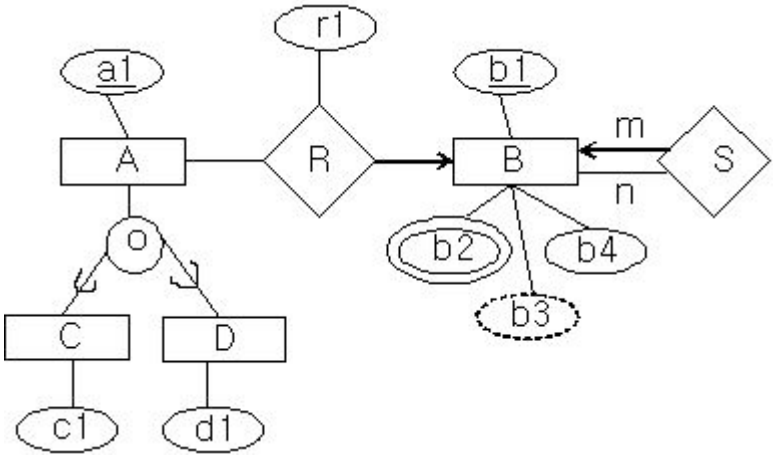
3) 20 pts

Reduce the following 2 EER diagrams to relations using the *pure relational model* (i.e., No Object Oriented or Object Relational). Make sure to identify all primary and foreign keys.

a-



b-



3) 20pts

a-Which of the following index structures are balanced:

- KDB tree
- Point quad tree
- PR quad tree
- R Tree
- $R^+$ Tree
- PM1 Tree

b- For each of the index trees above that are NOT balanced give a an example that shows the worst case scenario in terms of the index tree height. Your examples will be a sequence of points in the X-Y plane. Show both the index tree and the location of the points labeled with their order.

Additional space

4) 15 pts
Describe the following 4 types of JDBC drivers and identify their pros and cons.
a- JDBC-ODBC bridge

b- Java to Native API

c- Java to network protocol

d- Java to database protocol

Additional Space

Additional Space