Tutorial 7 (CZ2007) SQL

Classroom Exercise

1. a) Write SQL statements for the following queries.

The schema of a database containing university-type data is given below. Primary key is underlined for each relation.

STUDENT(Sid, Sname, Sex, Age, Year, GPA)
DEPT(Dname, Numphds)
PROF(Pname, Dname)
COURSE(Cno, Cname, Dname)
MAJOR(Dname, Sid) SECTION(Dname, Cno, Sectno, Pname) ENROLL(Sid, Grade, Dname, Cno, Sectno)

Write the following queries.Find the name(s) of student(s) with the lowest GPA.

b) Consider the relation R (A,B,C,D) with candidate keys AC and D. What will be the output of the following query? Justify your answer.

```
SELECT A, B
FROM R
WHERE C > (SELECT D FROM R WHERE C = 3);
```

2. Consider the following relational schema:

Reader(RDNR, Surname, Firstname, City, Birthdate)
Book(ISBN, Title, Author, NoPages, PubYear, PublisherName)
Publisher(PublisherName, PublisherCity)
Category(CategoryName, BelongsTo)
Copy(ISBN, CopyNumber, Shelf, Position)
Loan(ReaderNr, ISBN, Copy, ReturnDate)
BookCategory(ISBN, CategoryName)

BelongsTo refers to which parent categories the current category belongs to. Each book has a specific ISBN, and many copies of a book might be available under the same ISBN. A reader may borrow the same copy for multiple times, and each instance is recorded by its ReturnDate. All the [ ] categories that a book belongs to are stored in the table BookCategory.

Formulate the following queries in SQL.

(a) Which categories do not have any subcategories?

(b) For which of the books there is at least one copy available?

(c) Which books have more pages than twice the average of the number of pages of all books?

(d) What are the surnames of the readers from the city "New York"?

3. For the following relational schema:

employee (employee-name, street, city)

works (employee-name, company-name, salary)

company (company-name, city)

manages (employee-name, manager-name)

Give an expression in SQL for each of the following queries:

(a) Find the names of all employees who earn more than the average salary of all employees of their company. Assume that all people work for at most one company.

4. Suppose we are maintaining a database of articles published in our newspaper, the Straits Times. We have the following schema (where keys are underlined):

Article (issueID, articleID, author, title)

Citation (articleID, issueID, citedArticleID, citedIssueID)

WordAppears (wordID, issueID, articleID, position)

WordIs (wordID, wordText)

Issue (issueID, date, howManyDistributed)

For each of the following queries, write the query in SQL. Assume that dates can be compared using comparison operators (<, >, =). Assume that position is an index specifying where the word appears (1 = first word, 2 = second, etc.).

(ii) Find the most-cited article(s) in the newspaper's history.

(iii) Find the number of citations per author for "senior" authors (i.e., an author who has at least one article that was published 10 or more years ago).

Critical Thinking Exercise

5. Consider a database of flight departures and airplanes, with the following schema. The primary keys are in bold.

Departure (**departureID**, airplaneID, destination, departureTime, bookedSeats)

Airplane (**airplaneID**, modelID, fabricationYear)

Model (**ModelID**, name, capacity)

Give an SQL expression for the following query. Your solution should be only one SQL statement.

Lists all destinations that have more empty seats than the average number of empty seat on all departures (we assume that the number of empty seats is the number of booked seats subtracted from the capacity of the plane).

6. Consider the following schema containing airport flight information. Primary Keys are in bold.

FLIGHTS (**flno:integer**, from:string, to:string, distance:integer, departs:time, arrives:time)

AIRCRAFT (**aid:integer**, aname:string, cruisingrange:integer)

CERTIFIED (**eid:integer**, **aid:integer**)

EMPLOYEES (**eid:integer**, ename:string, salary:integer)

Note that the Employees relation describes pilots and other kinds of employees as well; every pilot is certified for some aircraft (otherwise, he or she would not qualify as a pilot), and only pilots are certified to fly.

Give an SQL expression for the following query. Your solution should be only one SQL statement.

Find the eids of employees who make the second highest salary