EFREI – M1 – RDBMS – 2007-2008
Written Exam (2 hours)

Yann Thierry-Mieg – Yann.Thierry-Mieg@lip6.fr

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All documents authorized.

1 General Questions (5/20)

1. What is a view in a database ? Describe some usage scenarios for a view.

2. What is a data dictionary ? Why is it useful to define one ?

3. Describe how business constraints can be implemented in a database.

4. What is a foreign key constraint ? Is it different from an index ?

5. How can one implement a security policy in an Oracle database ?

2 Design (7/20)

An access control system is designed to prevent unauthorized access to parts of a building. We consider an access control system designed to protect a building.

Each authorized person (name, position, end of permissions date) will receive an electronic badge with a unique identifier.

Security critical doors (name, location, description) will be equipped with card readers, to limit access to zones of the building.

A security policy then consists in defining groups of doors and groups of users.

- Each user (respectively door) is part of at least one group.

- Each user group is given access permission to a **set** of door groups.

For instance, the user group "Security Personnel" has full access to all the door groups. The user group "Students" is only allowed access to the door group "Student Lab Rooms".

1. Design an E/R schema to represent this system.

2. Give the relational model obtained from the E/R schema of question 1 by application of translation rules.

3. We now consider that a user group is allowed to access a door group but only within certain time frames.

   For instance, the user group "Security Personnel" has full access to all the door groups 24/7. The user group "Students" is only allowed access to the door group "Student Lab Rooms" and only from Mon. to Fri 7AM-8PM, and Sat. 7AM-2PM.

   To this effect, introduce the notion of time frame and update your schema of question 1 to reflect this new need.

3   SQL (8/20)

We consider the database CINEMA of schema :
MOVIE (<u>NUM-M</u>, TITLE, DATE-M, LENGTH, BUDGET, PRODUCER, SALARY-P)
PLAY (<u>MOVIE, ACTOR, ROLE</u>, SALARY)
ACTOR (<u>NUM-A</u>, NAMEA, LNAMEA, BIRTH, SEX, NATIONALITY)
CINEMA (<u>NUM-C</u>, NAMEC, ADRESS, PHONE, COMPANY)
THEATER (<u>NUM-T</u>, CINEMA , SCREEN-SIZE, PLACES)
SHOW (<u>MOVIE, CINEMA, DATE-S, TIME</u>, THEATER, PRICE)

NUM-M, NUM-A, NUM-C, NUM-T are unique identifiers. Primary keys are underlined.

Any relation name R used as attribute of another table is a foreign key refering to the primary key of the relation R. For instance, MOVIE in relation PLAY refers to primary key NUM-M of MOVIE relation.

1. Give the titles of films produced by Roman Polanski.

2. Give the movies that are not shown in any cinema of company UGC.

3. Give the name, last name and NUM-A of actors that have played in all films by Lelouch.

4. Find the name and last name of actors that were paid more than the producer in at least one movie.

5. For each movie produced by Bergman, find the name and last name of the actor that was paid the most in that film (NUM-M, TITLE, NUM-A, NAMEA, LNAMEA).

6. List all cinemas for which the average screen size is superior or equal to 40 square meters.

7. Write the creation script for table PLAY, assuming reasonable types for the attributes. Don't forget primary/foreign key definitions.