

Informatics 1 Data & Analysis

Tutorial 2

Week 4, Semester 2, 2013

- Please attempt all questions on this worksheet in advance of the tutorial, and bring with you all work, including printouts of code and other results. Tutorials cannot function properly unless you do the work in advance.
- Data & Analysis tutorial exercises are not assessed, but they are a compulsory and important part of the course. If you do not do the exercises then you are unlikely to pass the exam.
- Attendance at tutorials is obligatory: if you are ill or otherwise unable to attend one week then email your tutor, and if possible attend another tutorial group in the same week.
- *Optional Reading:* Chapter 3 (The Relational Model) of *Database Management Systems*, Raghu Ramakrishnan and Johannes Gehrke, 2003.

Introduction

In the previous tutorial, you designed an ER model for a database, based on a description of a poster exhibition scenario. In this tutorial, you will use the ER diagram to design a relational model, applying the techniques described in lectures.

Question 1: Relational Schema Notation

There are 5 mistakes in the SQL DDL schema below, what are they?

```
CREATE TABLE Film (  
    filmId          INTEGER,  
    title           VARCHAR(50),  
    year            INTEGER  
    director name  VARCHAR(50) NOT NULL,  
    language        VARCHAR(30),  
    PRIMARY KEY (filmId),  
    FOREIGN KEY director name REFERENCES Director,  
    FOREIGN KEY (leading_actor) REFERENCES Actor
```

Question 2 - Mapping ER to relational schemata

For this question, please use the ER model provided at the end of this tutorial sheet, which is a simplification of the solution for last week's exercise. Think about how the entity sets and relationship sets can be mapped to tables in a relational model. Then write out SQL `CREATE TABLE` statements to define all relations required for this database. These SQL declarations should include *primary key* and *foreign key* constraints as appropriate. The ER diagram gives a number of constraints on the

model — try to capture as many as you can; although it may not be possible to express all of them in relational schemas.

Things to think about: What different approaches are there for mapping relationship sets with key constraints? What are the advantages and disadvantages of each approach? Which approach did you choose for translating the provided ER model and why?

Question 3 - Refining the model

The following questions are about possible refinements to your relational model.

- (a) In your schemas, which fields are not allowed to take a *NULL* value by default? Are there any that you should disallow from taking a null value? What constraints on the data model can you establish by using *NOT NULL* declarations?
- (b) Consider the various foreign key constraints in your relational model design. In each case, what action would it be appropriate to instruct SQL to take on delete?
- (c) Suppose each graphic designer has to create exactly one poster. How would you represent this in your ER diagram? Would you be able to represent it in your relational model and if yes, how?
- (d) Reflect on your original relational model design. Can you implement the total participation constraint of *Poster* on the relationship sets *Creates* and *Judges*? If yes, how?
- (e) According to the original scenario: “Each poster is judged by three different judges.” Can you model this in your relational model? If yes, how?

More things to think about

- (a) Based on your answers so far, how do you think expressivity of the relational model compares to the ER model in this scenario?
- (b) Based on your answers for the above questions, what strategy would you recommend for designing a relational model for a given scenario? By directly translating the corresponding ER model, by directly translating the scenario, or as a combination of the two?

