B0B36DBS: **Database Systems**

Practical Class

Relational Model

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Exercise 1

Create an **ER** diagram for a simple **cinema** information system

Each **cinema** is identified by its name and has a website and a number of auditoriums. It is located at exactly one **venue** defined by a street and city and associated with information about public transport and parking possibilities. **Employee** has a unique birth number as well as employee number, has a structured name (comprising of a first name and last name), arbitrary number of degrees, and at least one postal addresses (each with street, city, and zip code in particular). Each employee may work in at most one cinema, with one overall salary in such a case, and at several different positions at a time. Finally, each employee has their boss (except the CEO).

Cinema may have up to several **auditoriums**, each with a locally unique number and a maximal capacity. Movie **screening** session is always scheduled to a particular auditorium, date, and time of beginning. **Movie** as such is identified by its title together with a year of production. Movie is also associated with a recommended ticket price for each screening.

Ticket is bound to a particular row and seat number. The actual ticket price and a unique artificially generated ticket number need to be stored as well. Two types of tickets are distinguished. **Paper ticket** is sold by a cinema employee, whereas **electronic ticket** has a verification code and can only be purchased online by registered users.

User is associated with their first name, last name, and multiple phone numbers. Unique e-mail address together with a hashed password value is used for the authentication. Users can also make **ratings** of movies, always in connection with a particular cinema.

Exercise 2

Transform the following parts of the cinema ER schema to the relational model

- **Cinema** entity type with all its attributes

Exercise 3

Extend the previous relational schema…

- **Venue** entity type and its relationship to cinemas
- Correctly determine keys and foreign keys (if relevant)

Exercise 4

Extend the previous relational schema…

- **Employee** entity type with all its attributes, including those with nontrivial multiplicities

Exercise 5

Extend the previous relational schema…

- Boss relationship type between employees
- Workplace relationship type including its attributes

Exercise 6

Extend the previous relational schema…

- **Auditorium** entity type including its dependency on cinemas

Exercise 7

Extend the previous relational schema…

- **Movie** entity type
- **Screening** entity type including its dependency on auditoriums of cinemas
- Relationship type between screenings and movies

Exercise 8

Extend the previous relational schema…

- **Ticket** entity type including its complete hierarchy

Exercise 9

Extend the previous relational schema…

- **User** entity type
- Sale relationship types for both paper and electronic tickets

Exercise 10

Extend the previous relational schema…

- **Rating** relationship type