Course A7B36DBS: Database Systems

Practice 02: Transformation of ER to Relational Model

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Recapitulation

Relational model

- Relation schema and relation
 - Atomicity, uniqueness, ordering, completeness
 - Keys, superkeys
 - Referential integrity
- Relational database schema and relational database
- Relations vs. tables

Recapitulation

Sample relational schema

Course(Code, Name, ...)

Schedule(<u>Id</u>, Event, Day, Time, ...), Event ⊆ Course.Code

… and data

Id	Event	Day	Time					
1	A7B36DBS	THU	11:00					
2	A7B36DBS	THU	12:45			Codo	Nomo	
2	A7B36DBS	тнн	1/1.20			Code	Name	•••
J	A/DJUDDJ	mo	14.50			A7B36DBS	Database systems	
4	A7B36XML	FRI	09:15				,	
						A7B36XML	XML technologies	
						A7B36PSI	Computer networks	

Recapitulation

Transformation of ER / UML to relational model

- What we have
 - ER: entity types, attributes, identifiers, relationship types,
 ISA hierarchies
 - UML: classes, attributes, associations
- What we need
 - Relation schemas with attributes and keys and foreign keys
- How to do it
 - Classes with attributes → relation schemas
 - Associations → separate relation schemas or together with classes (depending on cardinalities...)

Assignments

Create an ER conceptual schema for a simple cinema information system:

- Each <u>cinema</u> is identified by its name and has its residency at right one <u>address</u> which consists of a street and city only. <u>Employee</u>s have unique birth numbers as well as employee numbers, have structured names comprising of a first name, last name and degrees. They also have one contact address (street, city and zip code in particular.) Each employee may work in at most one cinema, at several positions at a time. Finally, each employee have its boss (except the CEO).
- Cinemas have several <u>halls</u>, each with a locally unique number and a given maximal capacity. All the <u>screening</u>s of movies happen in these halls (on which they are identification dependent). <u>Movies</u> as such are always identified by their title together with a year of their production. Screening sessions are scheduled to a particular date and time of beginning. They also have a recommended price for the only movie that is being screened.
- <u>Ticket</u>s to screenings are always sold to a particular row and seat number. We also need to store a
 price the given ticket have been sold and a unique and artificially generated ticket number. For
 practical reasons we distinguish between two types of tickets. <u>Ordinary</u> ones are sold by cinema
 employees, whereas electronic also have a verification code and are bought online by users.
- <u>User</u>s are described by their first name and last name, they can have multiple phone numbers. Their unique e-mail address together with a hashed value of their password is used for authentication. Users can also make <u>rating</u>s of particular movies, always independently for individual cinemas.

- Transform the following parts of the ER schema to the relational model:
 - Cinema entity type with all its attributes
 - Correctly determine all keys

- Transform the following parts of the ER schema to the relational model:
 - Address entity type and its relationship to cinemas
 - Correctly determine keys and foreign keys (if relevant)

- Transform the following parts of the ER schema to the relational model:
 - Employee entity type with all its attributes, including those with nontrivial multiplicities
 - Boss relationship type

- Transform the following parts of the ER schema to the relational model:
 - Workplace relationship type including all its attributes

- Transform the following parts of the ER schema to the relational model:
 - Hall entity type including its dependency on cinemas

- Transform the following parts of the ER schema to the relational model:
 - Screening entity type including its dependency on halls of cinemas
 - Movie entity type
 - Relationship type between sessions and movies

- Transform the following parts of the ER schema to the relational model:
 - Complete hierarchy of tickets

- Transform the following parts of the ER schema to the relational model:
 - User entity type
 - Sale relationship type for electronic tickets
 - Sale relationship type for ordinary tickets

- Transform the following parts of the ER schema to the relational model:
 - Rating relationship type