

Advanced Data Modeling

Summer Semester 2008

- Exercises I -

To be handed in before 2008-04-12, 23:59 via e-mail to sschenk@uni-koblenz.de, subject line: [ANN] ...

- 1) Model the following scenario using the relational data model. List all relation schemata, including domains of the attributes.

Scenario: Planning of teaching at a university.

There are different types of events: lectures, tutorials and seminars. Every event takes place in a certain room and has a start, an end time and a title. An event may have other events as prerequisites. Professors, students and research assistants are persons. Every person has a name and an e-mail address. Additionally, every professor has a working group and every research assistant works in a working group. Events are given by professors or research assistants. Every tutorial belongs to a lecture. Students attend events.

- 2) Create an instance of your database schema, modeling the following world knowledge:

Prof. Herbrand leads the working group of computational logic. Prof. Tarski leads the AI group. Mr Lloyd and Mr. Topor are Research Assistants of Prof. Herbrand. Prof. Herbrand gives the lecture on Advanced Data Modeling and Mr Lloyd gives the corresponding tutorial. There is a seminar about Datalog given by Mr. Topor. Joe attends the Advanced Data modeling lecture and tutorial. Jane attends the tutorial and the seminar. Jim attends a seminar called "Non-monotonic reasoning" by Prof. Tarski. Databases I is a prerequisite for Advanced Data Modeling. The Advanced Data Modeling tutorial is a prerequisite for doing the lecture and vice versa.

- 3) Formulate the following queries using relational algebra. Is it possible to model the queries using relational algebra? If not, why? If yes, list the results.
 1. List all rooms for events, which are not tutorials.
 2. List all students of professor Herbrand (attending events offered by the professor's working group). Provide two different queries.
 3. List **all** prerequisites for the lecture on Advanced Data Modeling. Please note that a prerequisite course may in turn again have prerequisites.
 4. List all courses without any prerequisites.
- 4) How would you model the following integrity constraints (using first order logic, or using relational algebra queries, which select invalid entries)? List all tuples violating the constraints.
 1. No Person is a Professor and a Research Assistant.
 2. Every student attends at least two events.
 3. No course has itself as a prerequisite.
- 5) Add a new event type Group Project to your schema. Formulate a new constraint that no event is a Lecture and a Group Work.