

DATABASES

ADIT - TDDD37

Lab compendium - Lecture material

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Institutionen för datavetenskap (IDA), Linköpings universitet

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Lecture Material: EER Modelling

Task 1 (introductory)

Make ER-models for the following tasks. For each of the task it is possible to model it in more than one way. Show the possibilities and discuss how to choose between the possibilities.

1. Persons live at an address.
Questions: Is the address important for the application? Do we need to model that several persons can live on the same address?
2. Books can be written by one or more authors.
Questions: Is the author important for the database? Can you speak about the author without talking about the book?
3. Customers rent video movies.
Questions: Do we want to store the rental history? Can a customer rent the same movie more than once?

Task 2 (adapted from an exam)

The IT department builds all their computers from components. Each computer consists of components like graphic cards, network cards, mother boards, memory capsules, hard discs, etc. When a component is bought it is given an ID number, and the component is marked with this number so that it will be possible to track each individual component. Every computer consists of a computer box, a graphic card, one or more hard drives, etc. The finished computer is placed in a room, and gets a person responsible for this computer.

Help the department by creating an ER or EER model form modelling computers and components.

Task 3 (from an exam)

Study the following data from Campushallen's homepage. (dag = day-of-week, tid = time, passtyp = type-of-exercise, lokal = room and ledare = leader):

Dag	Tid	Passtyp och Lokal	Ledare
Måndag	11:45 - 12:45	Gympa Campushallen, C-hall	Anna Tanttinen
Måndag	17:15 - 18:15	Gympa Campushallen, C-hall	Mikaela Nilsson
Måndag	19:30 - 20:45	Gympa järn 70 Campushallen, A-hall	Lotta Lövdahl
Tisdag	17:15 - 18:15	Gympa Campushallen, C-hall	Caroline Björk
Tisdag	18:45 - 20:00	Gympa Intensiv Campushallen, C-hall	Evelina Wikar
Onsdag	11:45 - 12:45	Gympa järn 55 Campushallen, C-hall	Juha Takkinen
Onsdag	17:15 - 18:15	Gympa Campushallen, C-hall	Louise Boström
Onsdag	19:30 - 20:45	Gympa järn 70 Campushallen, A-hall	Jenny Schwartz
Torsdag	17:15 - 18:30	Gympa Intensiv Campushallen, C-hall	Johanna Nyman
Torsdag	18:30 - 19:45	Gympa station Campushallen, A-hall	Robert Johansson
Fredag	12:15 - 13:15	Gympa utan hopp Campushallen, C-hall	Hans Vind
Söndag	16:30 - 17:30	Gympa Campushallen, C-hall	Evelina Wikar
Söndag	17:45 - 19:00	Gympa järn 70 Campushallen, C-hall	Renée Berglund

This is the weekly schedule for the activity Gympa. There are a number of similar schedules for different activities. Every activity occurs regularly each week. Below you see the daily schedule compiled from all weekly schedules.

Tisdag		6 December	
Pass	Tid	Passtyp och Lokal	Ledare
Aerobics	08:30 - 09:30	Aerobic Campushallen studion	Deja Özkan (Lina Wiktorzon)
Bodypump	12:00 - 13:00	Bodypump Campushallen, C-hall	Charlotte Strandgren (Anna Tanttinen)
Cycle	12:00 - 13:00	Cycle 2 Campushallen, Cyclesal	Sofia Boman
Bosu	16:00 - 16:45	inställt pass Campushallen studion	Karin Hagström
Aerobics	17:00 - 18:15	Step kondition Campushallen studion	Lotta Lövdahl
Gympa	17:15 - 18:15	Gympa Campushallen, C-hall	Caroline Björk
Cycle	17:15 - 18:15	Cycle 2 Campushallen, Cyclesal	Mattias Sjögren (Rasmus Vestberg)
Core	18:15 - 18:45	Core Campushallen, C-hall	Eva Malatios (Cici Svall)
Aerobics	18:15 - 19:30	Aerobic rhythm Campushallen studion	Anna Sjörs
Cycle	18:30 - 19:45	Cycle 3 intervall Campushallen, Cyclesal	Fia Brandberg (Mårten Kluck)
Gympa	18:45 - 20:00	Gympa Intensiv Campushallen, C-hall	Evelina Wikar
Aerobics	19:30 - 20:30	Step basic Campushallen studion	Ann Persson
Cycle	20:00 - 21:00	Cycle 2 Campushallen, Cyclesal	Malin Forsdal

As you can see changes are common, the leader is replaced on many of the occasions and some occasions are cancelled (inställt pass). These changes can occur with short notice and since the leaders only have competence to lead a specific subset of activities it is important to quickly find a competent leader to an activity.

- Create an EER model that describes Campushallen's schedules and can be used for their planning. It is important that you explain any additional assumptions that you make.
- How can you, in your model or in an intended implementation of it, handle the daily schedule that is presented for Campushallen's members and daily changes based on cancellations from leaders? For full point an extensive description is required.

Lecture Material: Normalisation

Task 1 (from an exam)

Given the universal relation $R=\{A, B, C, D, E, F\}$ and the following functional dependencies

$F=\{\{A \rightarrow BC\}; \{C \rightarrow AD\}; \{DE \rightarrow F\}\}$

4. Enumerate all the candidate keys of the relation and show how you arrive at the conclusion that they are candidate keys (apply the inference rules for functional dependencies)
5. Find a superkey for the relation.

Task 2 (adapted from an exam)

Smallville Garden Club rents garden beds for cultivating plants to their members. To be sure that the beds are used as efficient as possible they want to build the following database. (Each field has beds of a certain size.)

Owns(MemberNr, MemberName, BedNr, Field, BedWidth)

1. Make assumptions about the functional dependencies of the attributes.
2. Which are the candidate keys of this relation?
3. Which normal form is the relation in? Why?
4. Normalise stepwise into BCNF

Task 3 (difficult)

Consider the following table:

Recipe Name	Category	Ingredient	Where to shop ingredient
Spaghetti Bolognese	Quick	Minced Meat	Lilliput's Butcher Shop
Spaghetti Bolognese	Quick	Spaghetti	Coop
Spaghetti Bolognese	Quick	Tomato	Lilliput's Market
Spaghetti Bolognese	For children	Minced Meat	Lilliput's Butcher Shop
Spaghetti Bolognese	For children	Spaghetti	Coop
Spaghetti Bolognese	For children	Tomato	Lilliput's Market
Pizza Margherita	Easy	Tomato	Lilliput's Market
Pizza Margherita	Easy	Basil	Lilliput's Market
Pancake	Easy	Egg	Coop
...			

1. Which functional dependencies do you see?
2. What is the primary key of this relation?
3. Normalise stepwise into BCNF (stick to the algorithm, otherwise semantics get into your way).
4. (Advanced) If you replace the semantics-carrying attributes Recipe Name, Category, Ingredient, Where to shop... by A, B, C, D, does your normalisation result change? If not: Do you see a difference in the solutions if you model this mini-world as an EER-diagram and translate it into normalised tables? You should or you did not follow the algorithm in 3.