Data Modeling and Normalization Exercise taken from TOD122 exam spring 2010

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HVL

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The data

- Åse Åsen (Student ID: XY97235), female, born in 1990, Norwegian, National ID (Fødselsnummer): 230790 35432, Room: E815, Room phone: 35 98 23 75
- Ola Lien (Student ID: XZ45535), male, born in 1987, Finnish,
 National ID: 150287 03225, Room: A153, Room phone: 35 98 12 35
- ▶ Jacob R. Smith (Student ID: TT98762), male, born in 1992, National ID: 211292 02212, Room: A122, Room phone: 35 98 12 29
- Patterson, Jane K (Student ID: XQ82319), female, born in 1979,
 National ID: 191179 01231, Room: C632, Room phone: 35 98 21 11
- ▶ Brown, Richard E (Student ID: TZ18201), male, born in 1987, British, National ID: 300787 18979, Room: B332, Room phone: 35 98 19 19

The queries

The following queries will be carried out on the data:

- Find out the average ages of all female tenants from the same country. Namely, find out the average ages of female tenants grouped by nationalities.
- Search for the full names and room phone numbers of all tenants whose surnames are "Lien", ordered by first names lexicographically.

Data sample

Åse Åsen (Student ID: XY97235), female, born in 1990, Norwegian, National ID (Fødselsnummer): 230790 35432, Room: E815, Room phone: 35 98 23 75

The exercise

- See the exam for the complete exercise.
- ▶ We will here only focus on the design of the database.
- Will make a 3NF logical database model suited for the given queries.

First attempt (done by many students)

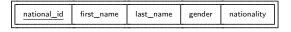


Table: Entity Person



room_number phone_number

Table: Entity **Student**

Table: Entity Room

- ► The queries:
 - Required attributes: national_id, nationality and gender.
 - Required attributes: first_name, last_name and phone_number.

First attempt

Discussion

- ► (The attributes of entity **Student** could have been put into **Person**.)
- Is the model good?
- It is 3NF, but:
 - It is not good for the queries!
- ► The problem:
 - The model give unneccesary joins (more on this later).
 - Query 2 requires a join between all the entities.
 - Performance may suffer!

A solution?

Question

Can we make a 3NF model where all attributes required by a query belong to the same entity?

A working solution



Table: Entity Student



Table: Entity Room

The queries:

- Required attributes: national_id, nationality and gender.
- 2 Required attributes: first_name, last_name and phone_number.