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Databases and XML (1) – 02.09.2015

| Time	Activity
08.30	Welcome and presentation of the course
09.05	ER diagrams
09.15	Data modelling exercise
10.00	Break
10.30	SQL
10.45	SQL assignment
12.00	Break
12.30	SQL assignment
13:55	Homework, preparation and next week

Today's agenda

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- My initials: TOSK
- My office: A2.15

- MSc of Computer Science
- Examples of experience:
  - Designing brand new database for a cheese dairy
  - Navigating in huge production database systems at Arla

- SQL server 2008, 2012

Torill H. Skytte

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And my son is named Robert…
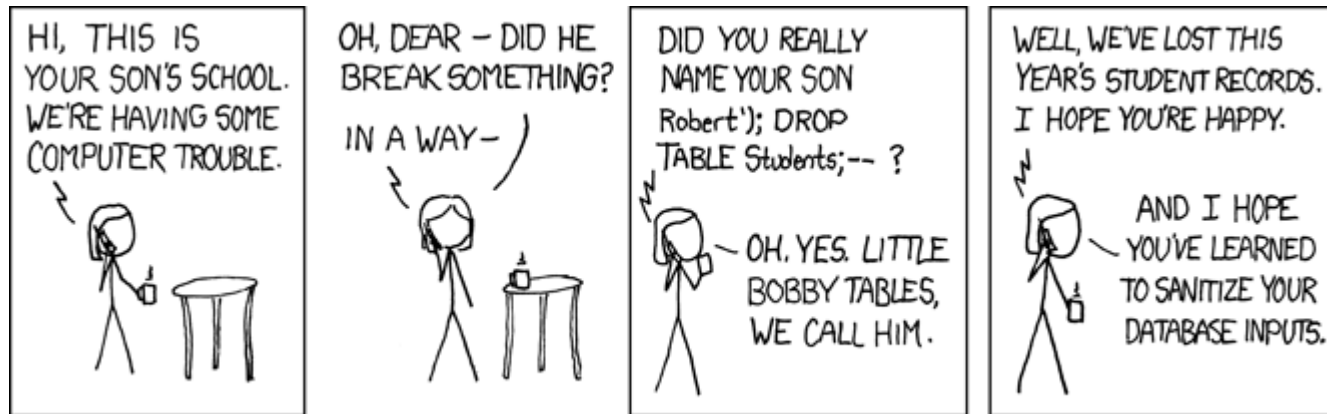
xkcd.com/327

Bobby Tables

Database design and ER modelling (Chen and Crow's foot)

Basic SQL commands
SELECT, INSERT, UPDATE, DELETE, WHERE, ORDER BY, JOINs, GROUP BY

Advanced SQL commands
Views, Stored Procedures, Triggers, Transactions

Microsoft SQL Server

NoSQL (MongoDB)

JSON and XML

Course description

9. October @ 23.59

6. November @ 23.59

Mandatory assignments consists mostly (75%) of the assignments from the lectures

Mandatory Assignments

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Preparation: reading, video and assignments

Today's subject

Exercise(s)

Wrap up / more subjects

Assignment

Conclusions

Typical lecture day

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You meet up prepared
(3,5 hours of lectures = at least 7 hours of preparation)

You participate actively in study groups
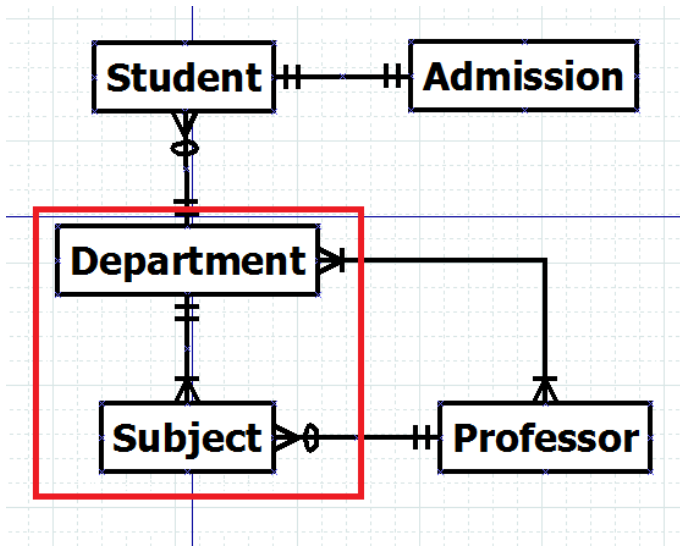and try to finish all the exercises

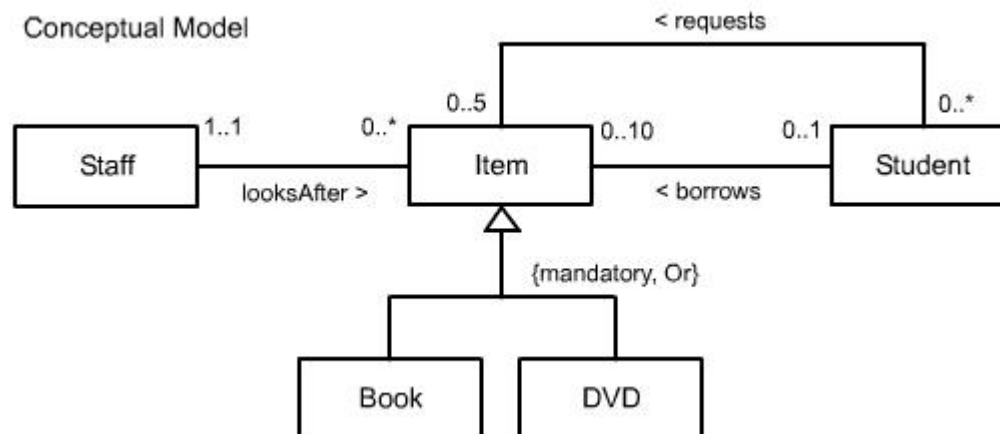You hand in your assignments on time

My expectations to you

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Entity-relationship model
Describing the different parts and relations in an abstract way before implementing them in a database.

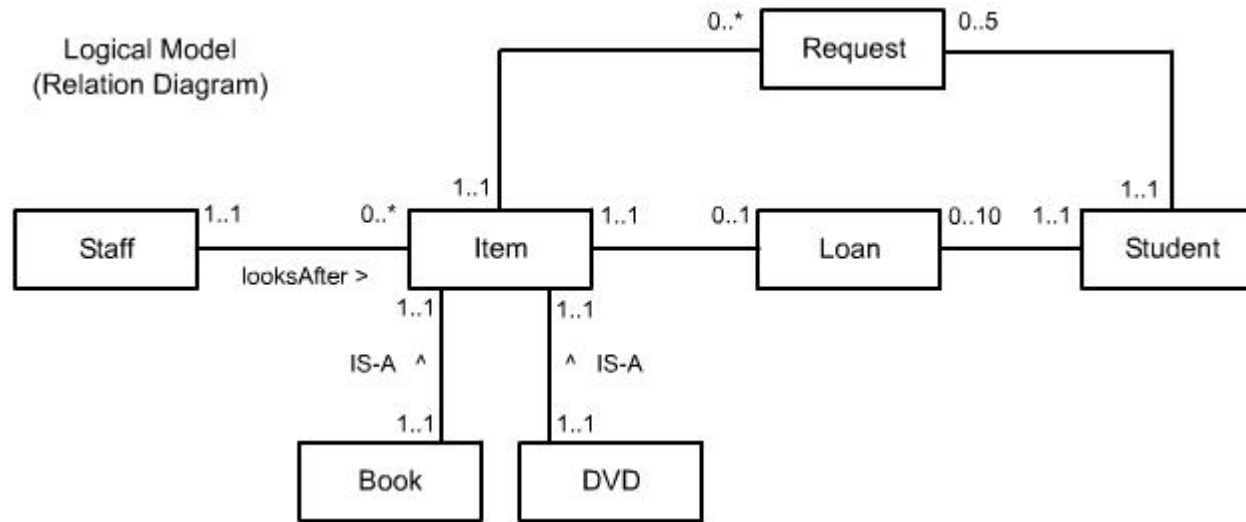ER model

Conceptual data model – highest level ER, very little detailed. Useful e.g. to establish an overview for an entire enterprise.

Conceptual Model

< requests

	0..5		0..*
Staff 1..1	0..* Item	0..10	0..1 Student
looksAfter >		< borrows	

{mandatory, Or}

Book   DVD

ER model

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Logical data model – includes master data entities, operational and transactional data entities. Independent of technology.

Logical Model
(Relation Diagram)

	0..*	Request	0..5	

```
                                    1..1
Staff  1..1        0..*   Item  1..1     0..1   Loan  0..10  1..1   Student  1..1
       looksAfter >
               1..1        1..1
               IS-A  ^     ^  IS-A
               1..1        1..1
               Book        DVD
```

ER model

Physical data model – contains enough details to actually implement the database, like a picture of the database, but made in advance.
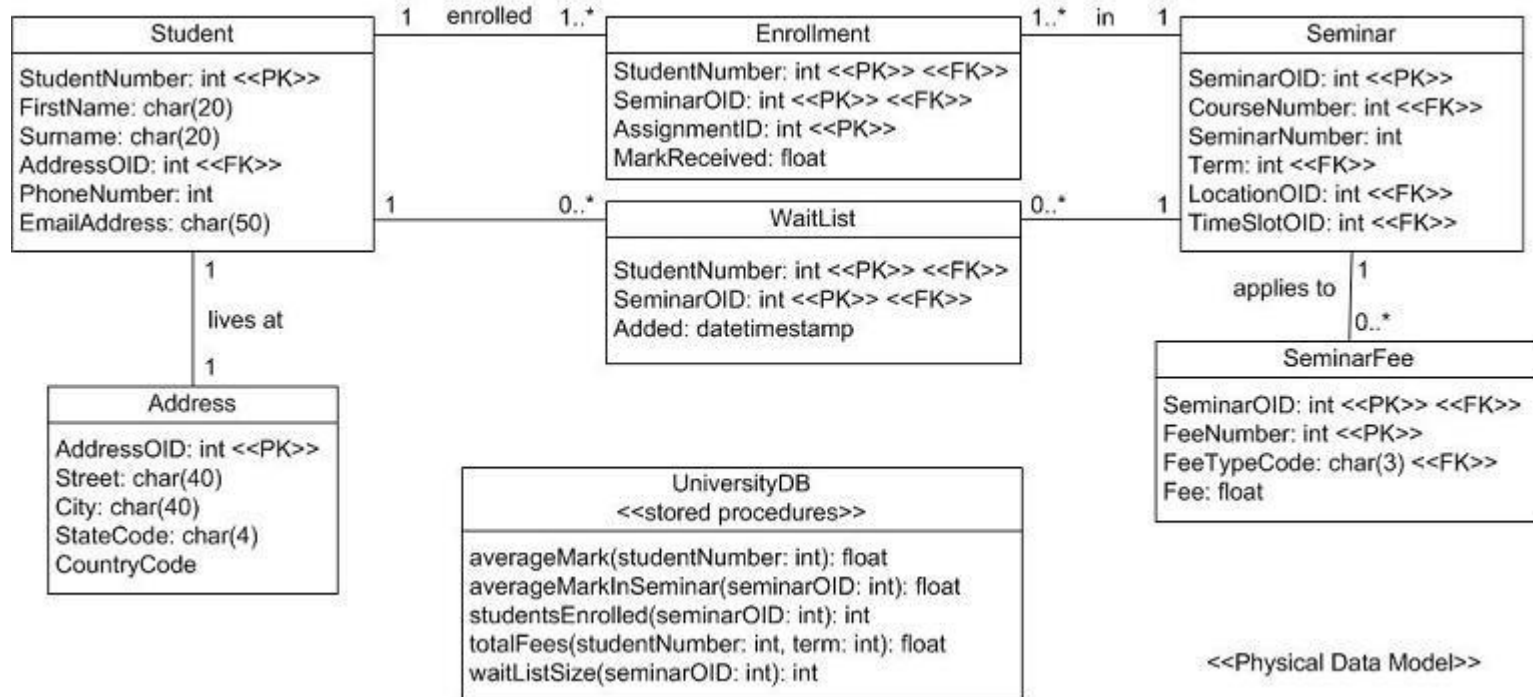
ER model

Data modelling exercise

Our data is the result of two questions from the PollApp exercise last week ("Favorite pet?" and "Favorite cake?").

With data modelling (ER diagram) as a tool, we now want to plan a database to collect our data.

What will the ER diagram look like after 1., 2., and 3. order normalization?

5 minutes on each normalization step
Draw each phase in a ER diagram

Data modelling exercise

AnswerId	Answer	Question	Email
1	Cat	Favorite pet	TOSK@eaaa.dk
2	Chokolate	Favorite cake	TOSK@eaaa.dk
3	Cat	Favorite pet	NIHA@eaaa.dk
4	Dream	Favorite cake	NIHA@eaaa.dk
5	Dog	Favorite pet	MVKH@eaaa.dk
6	Lemon	Favorite cake	MVKH@eaaa.dk
7	Dolphin	Favorite pet	JEAR@eaaa.dk
8	Cinnamon	Favorite cake	JEAR@eaaa.dk

1NF

Answer
AnswerId
Answer
Question
Email

Data modelling 1N

AnswerId	OptionId	QuestionId	Email
1	1	1	TOSK@eaaa.dk
2	4	2	TOSK@eaaa.dk
3	1	1	NIHA@eaaa.dk
4	5	2	NIHA@eaaa.dk
5	2	1	MVKH@eaaa.dk
6	6	2	MVKH@eaaa.dk
7	3	1	JEAR@eaaa.dk
8	7	2	JEAR@eaaa.dk

OptionId	Option
1	Cat
2	Dog
3	Dolphin
4	Chocolate
5	Dream
6	Lemon
7	Cinnamon

QuestionId	Question
1	Favorite pet?
2	Favorite cake?

2NF
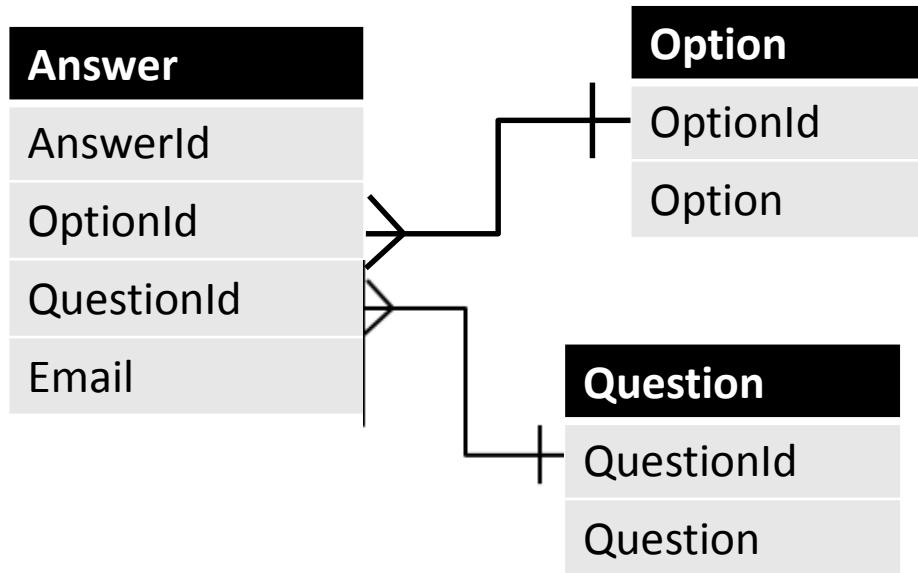
Data modelling 2N

AnswerId	OptionId	QuestionId	UserId
1	1	1	1
2	4	2	1
3	1	1	2
4	5	2	2
5	2	1	3
6	6	2	3
7	3	1	4
8	7	2	4

OptionId	Option
1	Cat
2	Dog
3	Dolphin
4	Chocolate
5	Dream
6	Lemon
7	Cinnamon

QuestionId	Question
1	Favorite pet?
2	Favorite cake?

UserId	Email
1	TOSK@eaaa.dk
2	NIHA@eaaa.dk
3	MVKH@eaaa.dk
4	JEAR@eaaa.dk

3NF

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Data modelling 3N

Break

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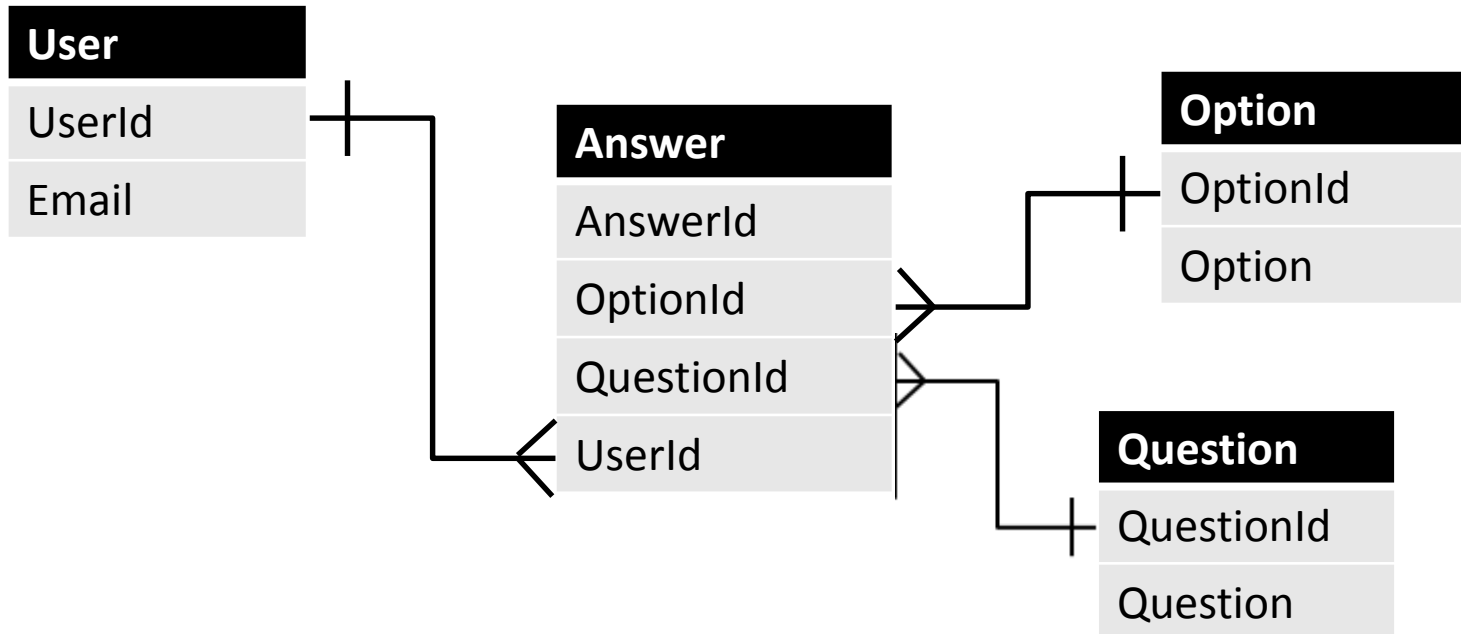
Structured Query Language
1974 – SEQUEL (Structured English Query Language)

Declarative programming language – resembles English and is very logical.
Transform-oriented language – a language designed to use relations to transform inputs into required outputs.
Nonprocedural language – you specify *what* information you require, rather than *how* to get it.

Most common language in relational databases. The first and, so far, only standard language to gain wide acceptance.

Basic queries consist of:
CREATE, ALTER, DROP
SELECT, WHERE, ORDER BY
INSERT, UPDATE, DELETE

SQL

Formal terms	Alternative 1	Alternative 2
Relation	Table	File
Tuple	Row	Record
Attribute	Column	Field

A **domain** is the set of allowable values for one or more attributes.

The **degree** of a relation is the number of attributes it contains.

The **cardinality** of a relation is the number of tuples it contains.

Terminology

SQL assignment

SQL assignment

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Break

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Continue SQL assignment

Next week's topic:

Complex data modelling

Normalization, participation, constraints, Crow's foot and Chen

Advanced SQL

Embedded SELECTs, Views

Assignment: Datamodel_home.pdf

Read:

- MSDN1 (again if you already read it for this week)
- Chapter 3 in T-SQL
- Beginning T-SQL – Views.pdf

Pluralsight videos:

[DATAMODEL]

Homework and preparation