

Database Systems

Joint seminar EA4B33DS + A4B33DS

<http://cw.felk.cvut.cz>

Seminar Organization
Database System Introduction

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Database Systems - Objectives

- How
 - design database systems? (*E-R Models*)
 - query database systems? (*SQL*)
 - operate with data in database systems? (*Insert, Update, Delete*)
 - implement a logic layer in database systems? (*Procedural Languages*)
 - optimize data quering? (*Indexes, Query Explain*)
 - use data from database systems in JAVA? (*JPA-2, SQL Injection*)

Database Systems - Assessment requirements

- At most 2 absences
- Groups including 2 students
 - Work on own topic (max 35 points going to the exam)
 - **Topic introduction** (3rd week)
 - **E-R Model** (6th week)
 - **JAVA application demonstration** (14th week)
 - **Advanced Database System Skills** (14th week, voluntary)

Database Systems - Assessment requirements

- ***E-R Model*** (6th week, last possibility 7th week)
 - Min 5, Max 10 points
 - Min 6 entities, at least 1 N:M relationship
 - Including description of any integrity constraints

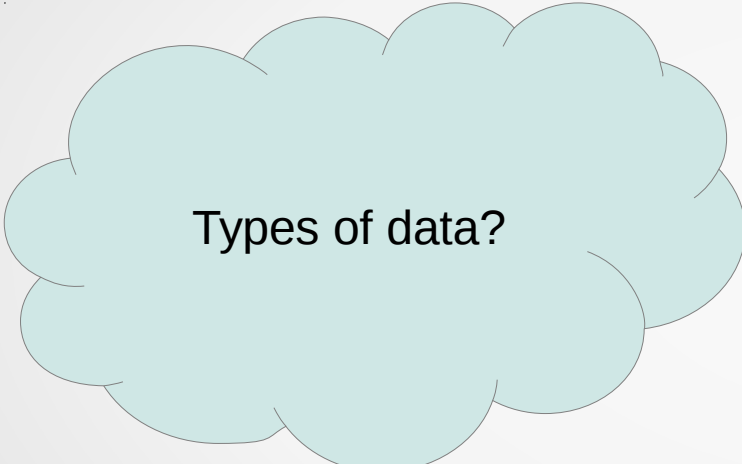
Database Systems - Assessment requirements

- ***JAVA application demonstration*** (14th week)
 - *Database usage* (2 of 3 – each 4 points, max 8 points)
 - Triggers, stored procedures
 - Writable view
 - JPA 2 + Criteria API
 - *User Interface* (max 5 points)
 - GUI – Swing
 - Demonstration of data manipulation at least in N:M relationship
 - *SQL client Demo* (max 7 points)
 - Client generating data (probably N:M relation)
 - Interesting (topic dependent) SQL queries, at least some using aggregation

Database Systems - Assessment requirements

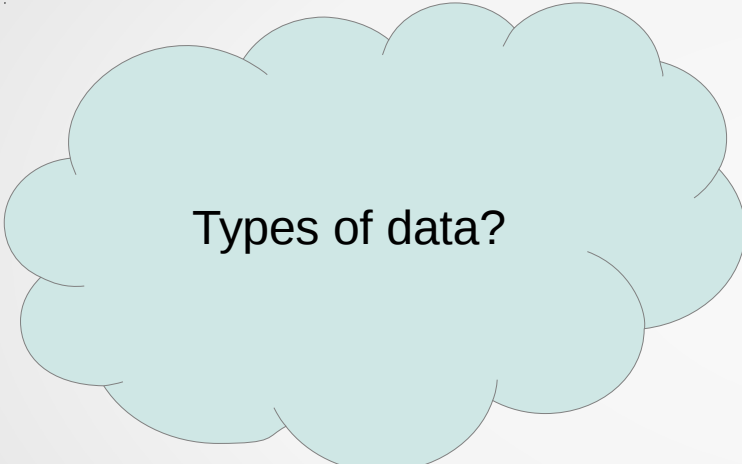
- **TEST of Database Skills** (14th week – a voluntary part)
 - Max 5 points
 - Form: „*Quide for students, how such a problem can be solved*“
 - Can be:
 - Nontrivial optimization (EXPLAIN, INDEX)
 - Nontrivial usage of stored procedure
 - Nontrivial query

Introduction to Database Systems



Types of data?

Introduction to Database Systems



Types of data?

- Structural data
 - Tabular (relational) data
 - XML (JSON,...)
- Time sequences (measurements,...)
 - Streamed data
- Multimedia
 - Picture
 - Sound and Video
 - Copy
 - Streams

Introduction to Database Systems



How to store
structural data?

Introduction to Database Systems



How to store
structural data?

- **Text data (XML)**
 - Machine and human readable
 - Redundant format
- **Binary data (MS Word DOC)**
 - Machine readable only
 - More effective
 - Depends on (proprietary) format
 - May be changed in next version
 - **compatibility**

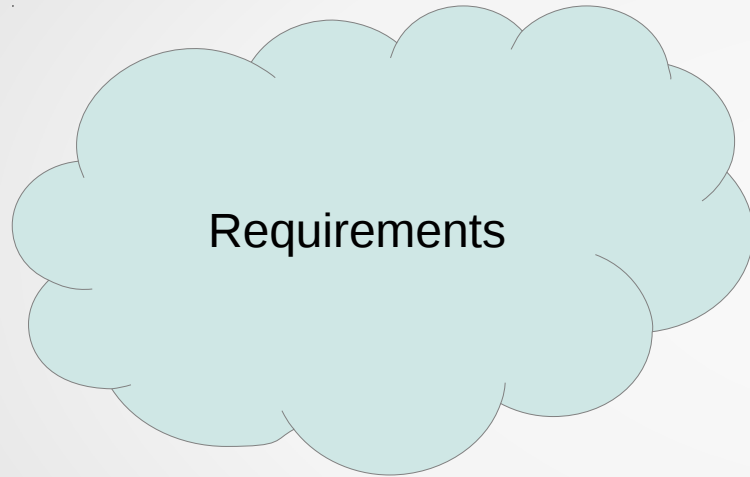
Introduction to Database Systems



How to store
structural data?

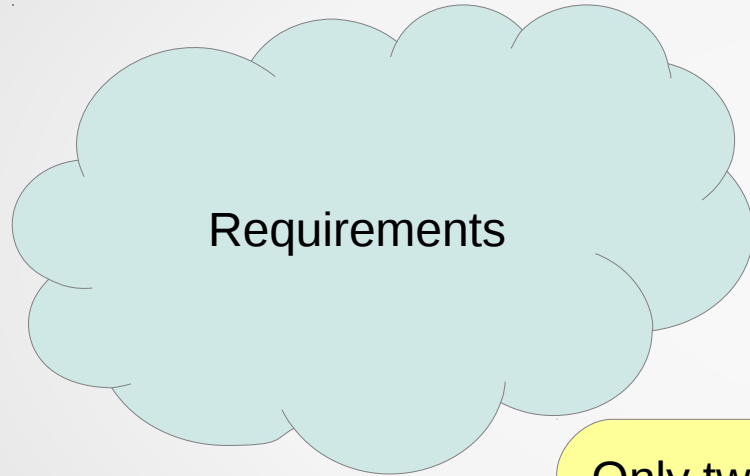
- **File System**
 - Easy to backup
 - Easy right management
 - Issue with participation of many users (locks)
- **Centralized Storage**
 - Easy to access by many users
 - Mostly client/server
 - Database systems

Introduction to Database Systems



- Atomic Operations (real time)
- Consistency (to be actual)
- Geographically Distributed

Introduction to Database Systems



- Atomic Operations (real time)
- Consistency (to be actual)
- Geographically Distributed



Only two properties can be kept:

- Atomic operations and consistency
 - **Database systems** (*client/server*)
- Geographic Distribution and (Atomicity or Consistency)
 - **Clouds** (*distributed, mostly (proxied) peer to peer*)