Database Theory

VU 181.140, SS 2011

0. General Information

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Outline

Classes

- Language. This lecture will probably be held in English.
- Place.
  - Classes will be held in the Gödel Seminarraum (Favoritenstraße 9-11, ground floor).
- Time.
  - Throughout the term: Tuesdays, 9:00 – 11:00.
  - additional classes (if needed): Depending on the number of participants, additional classes might be needed for the students' presentations in June (details to be announced later).
- Prerequisites.
  - Basic knowledge in mathematical logic and complexity theory needed.
  - It is therefore highly recommended to attend this course after the course Formale Methoden der Informatik (185.291).

Communication

- (during, after) classes
- Course Homepage:
  `http://www.dbai.tuwien.ac.at/staff/pichler/dbt`
- TISS: please check your mail address in TISS

Course Overview (Tentative Plan)

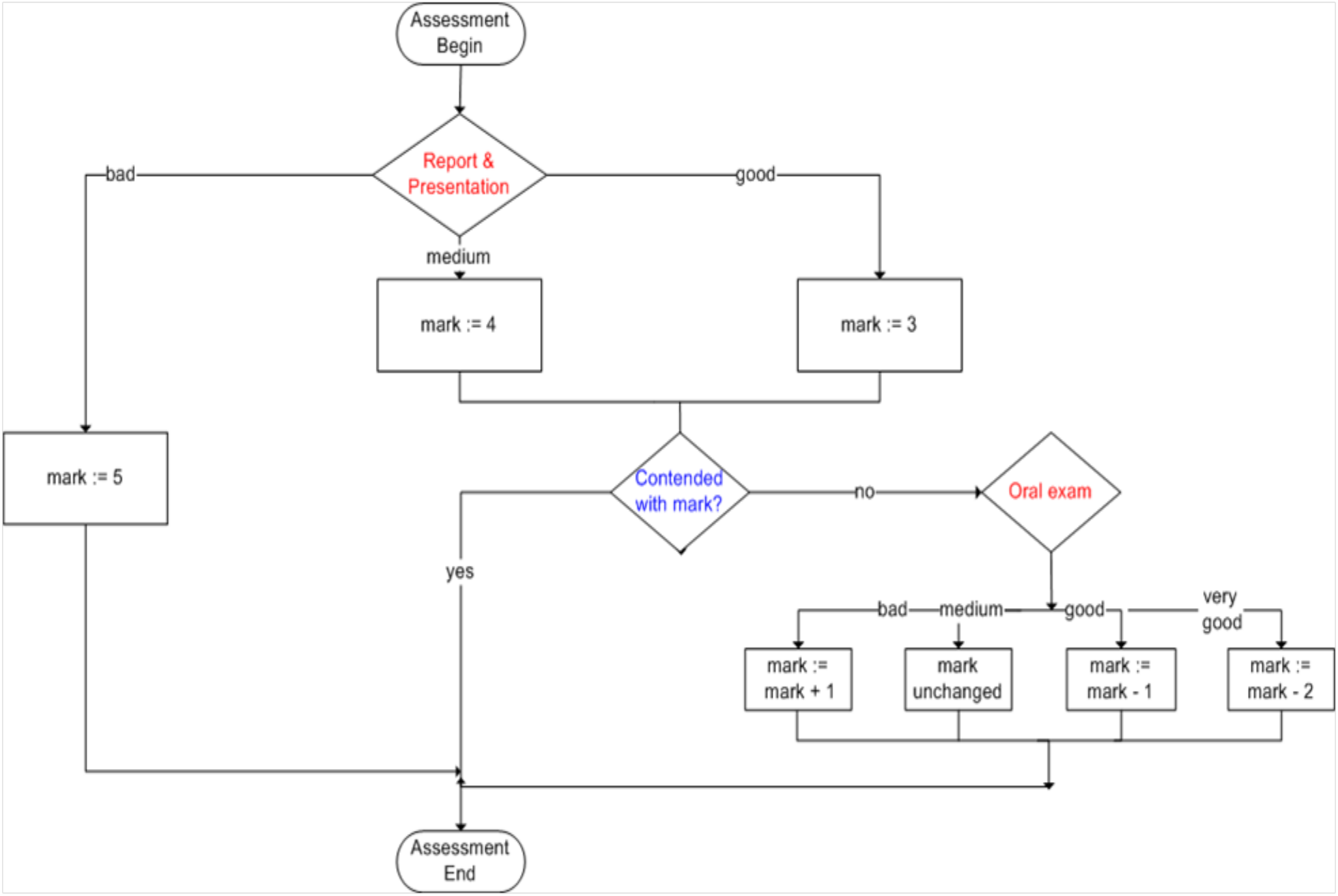
Fundamental aspects of (relational) query languages

- Relational algebra vs. relational calculus vs. SQL
- Introduction to datalog
- Codd's Theorem: relational algebra vs. First-Order logic
- Trakhtenbrot's Theorem: some undecidability results
- Complexity of Query Evaluation
- (Acyclic) Conjunctive Queries
- Inexpressibility Results (Ehrenfeucht-Fraïssé Games, 0-1 Laws)

Assessment

Components

1. Individual work on 1 article from database theory research
   - Details (e.g. assignment of articles) to be provided later
   - Short written report of this article (2–3 pages)
   - Oral presentation (ca. 20 min, depends on number of participants)
   - Sufficient to get mark 3 (or worse)
2. Oral exam
   - positive assessment of report & presentation required
   - exam not compulsory, but required for marks 1 and 2


Assessment Begin
Report & Presentation
bad
good
medium
mark := 4
mark := 3
mark := 5
Contended with mark?
no
yes
Oral exam
bad
medium
good
very good
mark := mark + 1
mark unchanged
mark := mark - 1
mark := mark - 2
Assessment End

Assessment of Report & Presentation

Criteria of a good report & presentation

- reasonable effort (30 - 40 hours)
- basic understanding of the article
- honestly identify parts which you did not understand
  (give a justification: which prerequisites were missing?)
- relate the article to the contents of the course
- quickly check important background articles
- (presentation) being able to answer questions
  (in particular, those relating the article to the course)

Some Related Lectures

- Complexity Theory
  181.142 – 2.0 VU – Komplexitätstheorie (in the summer term)
  Reinhard Pichler
- Other aspects of database theory: incomplete information
  181.198 – 2.0 VU – Advanced Database Systems
  (in the summer term 2011 for the last time)
  Reinhard Pichler
- Datalog
  184.247 – 2.0 VU – Deduktive Datenbanken (in the winter term)
  Stefan Woltran
- Logic
  see `http://www.logic.at/lvas/`

DB Literature

Most Important DB-Conferences

- ACM SIGMOD:
  - "International Conference on Management of Data"
  - 2011 in Athens: `http://www.sigmod2011.org`
- VLDB:
  - "International Conference on Very Large Data Bases"
  - 2011 in Seattle: `http://www.vldb.org/2011/`
- ICDE:
  - "IEEE International Conference on Data Engineering"
  - 2011 in Hannover: `http://www.icde2011.org/`

Most Important DB Theory Conferences

- ACM PODS:
  - "Symposium on Principles of Database Systems"
  - always in conjunction with SIGMOD
  - 2011 in Athens: `http://www.sigmod2011.org`
- ICDT:
  - "International Conference on Database Theory"
  - 2011 in Uppsala: `http://edbticdt2011.it.uu.se/`

Most Important DB-Journals

- ACM TODS:
  - "ACM Transactions on Database Systems"
  - free access from TUWIEN domain via ACM digital library
  - `http://portal.acm.org/dl.cfm` → "Transactions" → "ACM Transactions on Database Systems (TODS)"
- VLDB Journal
  - free access from TUWIEN domain via University library
  - `http://www.ub.tuwien.ac.at/` → "E-Journals" → "Universitätsbibliothek der TU Wien" → search for "VLDB Journal"

Access To Articles

Access from the TUWIEN domain is free to (almost) all major conferences and journals.

- SIGMOD, PODS proceedings
  - free access from TUWIEN domain via ACM digital library
  - `http://portal.acm.org/dl.cfm` → "Proceedings" → {SIGMOD, PODS}
- VLDB proceedings:
  - free access from anywhere
  - `http://www.vldb.org/` → "VLDB Conferences"

Access To Articles (continued)

- ICDE proceedings
  - free access from TUWIEN domain via IEEE Xplore Digital Library
  - `http://www.ieee.org/web/publications/xplore/` → search for "ICDE"
- ICDT proceedings:
  - free access from TUWIEN domain via University library
  - `http://www.ub.tuwien.ac.at/` → "eBooks" → "Springer Reihen" → "Lecture Notes in Computer Science" → search via volume (e.g., ICDT 2007 has volume 4353 of LNCS)
  - Remark. Meanwhile, ICDT has ACM proceedings.
  - The proceedings are easily obtained via DBLP (see below).

Comfortable Search & Access via DBLP

- DBLP "Computer Science Bibliography"
- contains information on (almost) all relevant publications
- Overview: `http://www.informatik.uni-trier.de/~ley/db`
- Google-search, e.g., "DBLP <author>" or "DBLP <conference>"
- access to the article: via "EE"-field (electronic edition)
- free access from TUWIEN-domain as described above (e.g., ACM digital library, Springer Verlag, etc.)

Alternative Search Methods

- Citeseer, e.g., Google-search: "citeseer <title of article>"
- `http://scholar.google.com` (keyword search)
- Authors' Homepages