

Architecture and Implementation of Database Systems

Winter 2010/11

Torsten Grust
Wilhelm-Schickard-Institut für Informatik
Universität Tübingen



Chapter 1

Introduction

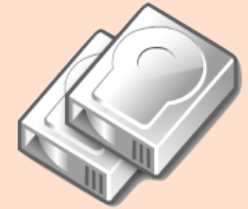
Preliminaries and Organizational Matters

Architecture and Implementation of Database Systems

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Introduction

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Architecture of a
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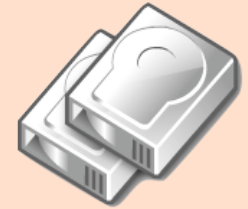
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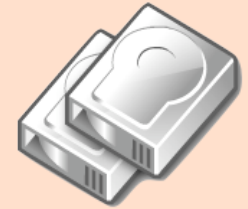
Welcome all ...

...to this course whose lectures are primarily about digging in the mud of database system internals.

- While others talk about SQL and graphical query interfaces, we will
 - ① learn how DBMSs can **access files on hard disks without paying too much for I/O traffic,**
 - ② see how to **organize data on disk** and which kind of **“maps” for huge amounts of data** we can use to avoid to get lost,
 - ③ assess what it means to **sort/combine/filter data volumes that exceed main memory size** by far.



Welcome all...



- Others use fancy web forms and click “**Go!**” buttons, while are going to
 - ④ learn **how user queries are represented and executed** inside the database kernel,
 - ⑤ talk about methods that allow *many users to consistently read and modify a database at the same time*,
 - ⑥ and take care of what needs to be done **once the DBMS (or its host) crashed** and we have to **resume operation in a controlled fashion**.

Architecture of a DBMS / Course Outline

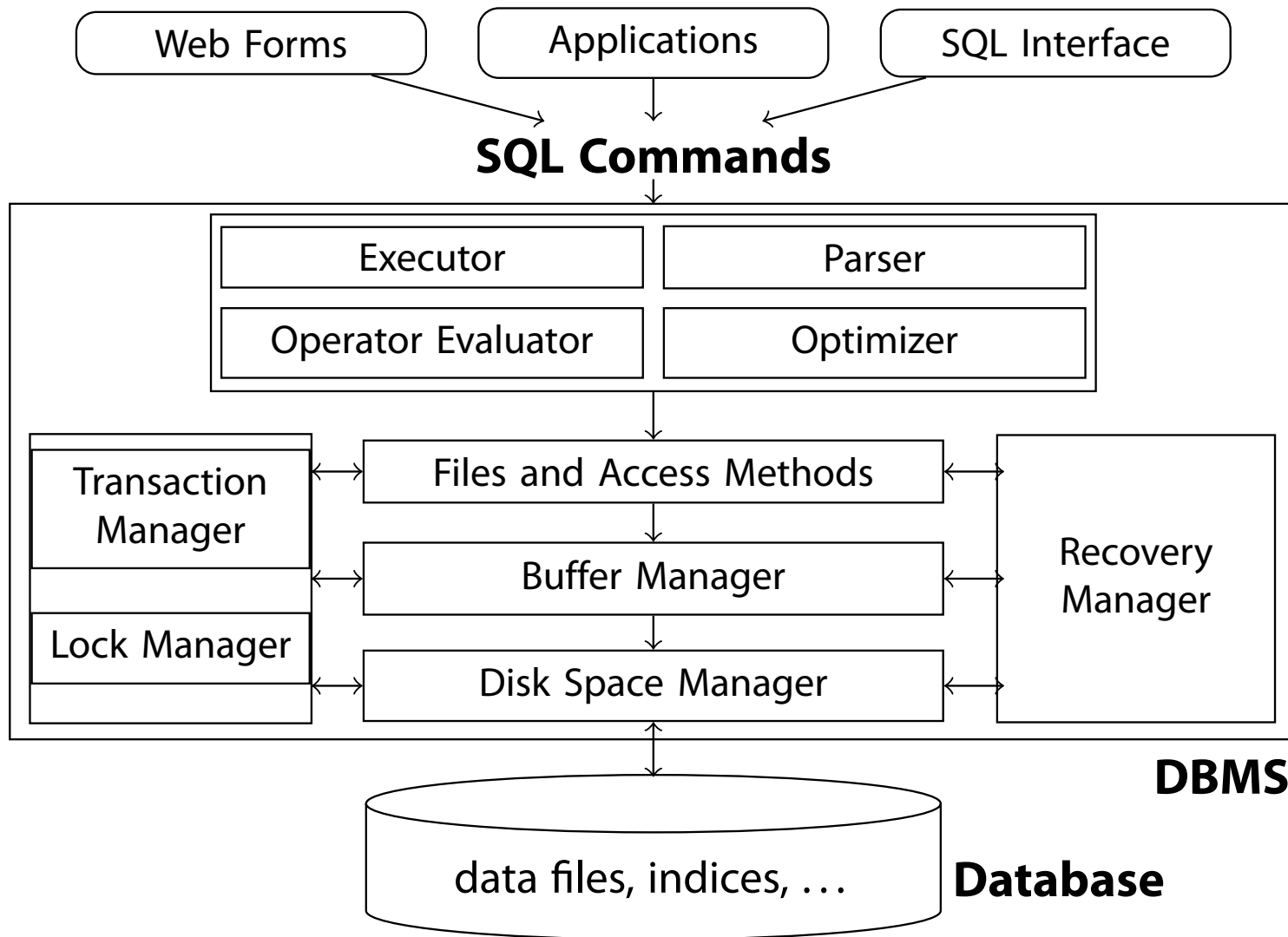
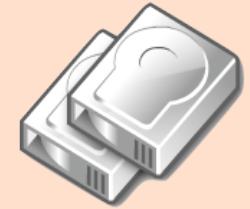


Figure inspired by Ramakrishnan/Gehrke: "Database Management Systems," McGraw-Hill 2003.

Architecture of a DBMS / Course Outline

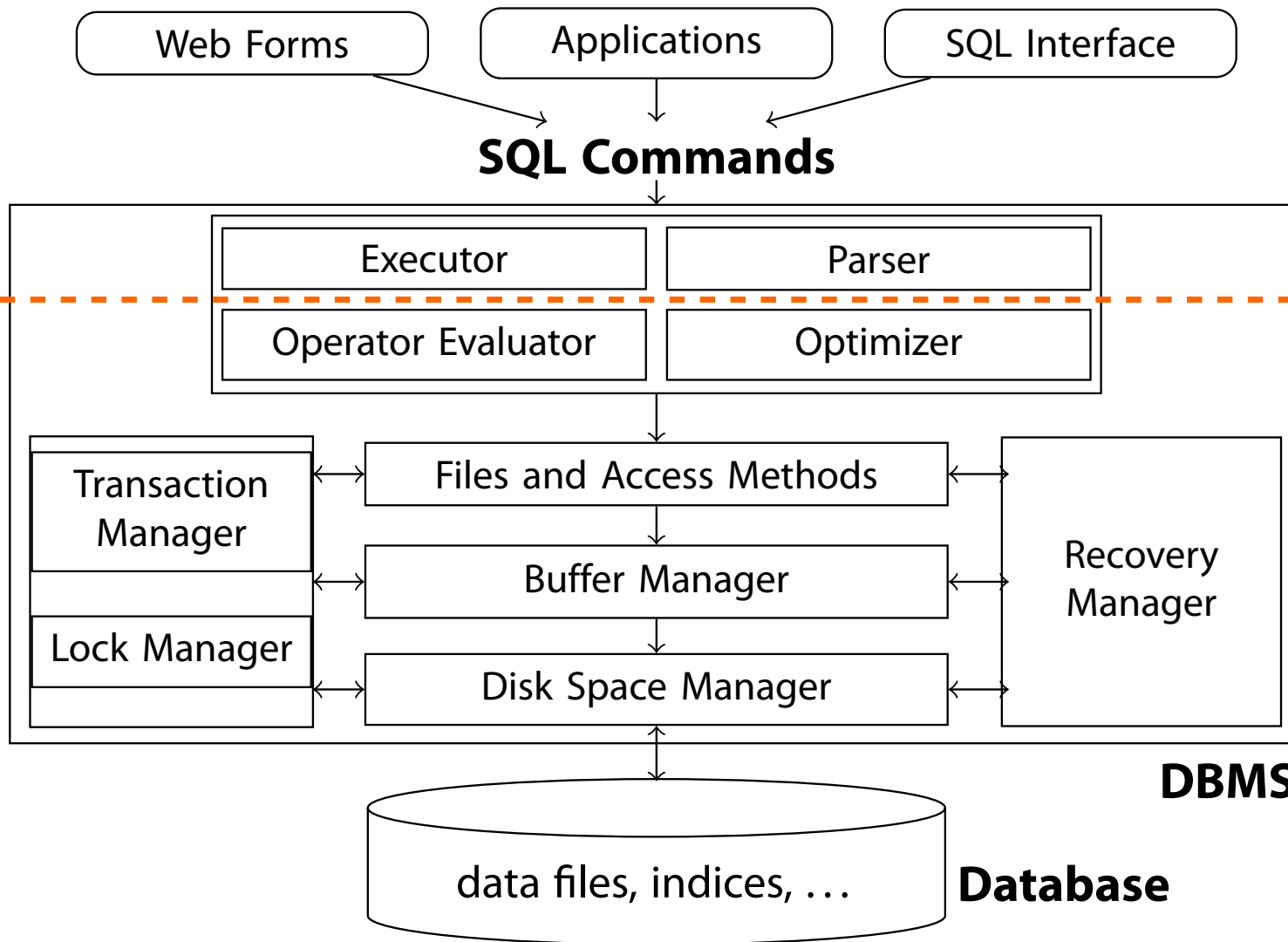
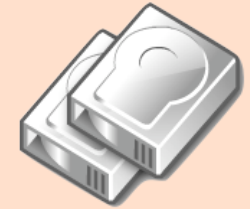
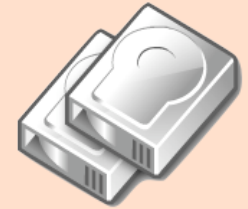


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A Few Words About Myself



Torsten Grust

Originally from Hannover

1989–1994 Student of Computer Science @ TU Clausthal

1994–2004 Database Research @ U Konstanz

1999 Promotion

2000 Visiting Scientist @ IBM, Silicon Valley Lab,
DB2 Everyplace Development

2004 Habilitation

2004–2005 Professor @ TU Clausthal

2005–2008 Professor @ TU München

since 9/2008 Professor @ U Tübingen

Web home `www-db.informatik.uni-tuebingen.de`

Coordinates B318, Sand 13

+49 7071 29-78952 (Monika Weber)

Organizational Matters

Lectures

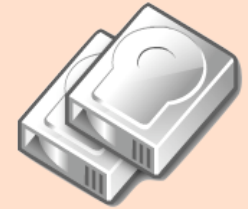
When	Where
Tuesdays, 10:15–11:45	Sand 13, A301
Thursdays, 10:15–11:45	Sand 13, A301

`http://www-db.informatik.uni-tuebingen.de/
teaching/ws1011/db2`

Please visit regularly — we will post slides and course updates.

Introduction

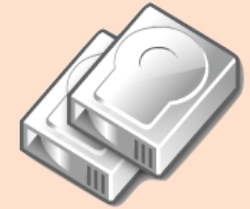
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Exercises (Manuel Mayr)

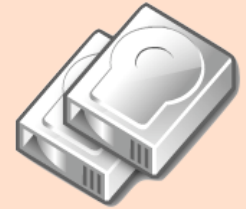
When	Where
Thursdays, 14:15–15:45 (starts Oct 21, 2010)	Sand 13, A301

In-depth discussion of course topics, exercise sheets, plus occasional additional material.

Examination

Introduction

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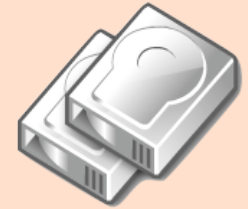
Organizational
Matters

- **Written exam** to be held on **Tuesday, Feb 1, 2011** (this is the regular lecture slot).
- You will be allowed to bring **1 (one) hand-written double-sided piece of A4 paper** with notes.
- Further details will be posted.

Reading Material

Introduction

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Architecture of a
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Organizational
Matters

- Raghu Ramakrishnan and Johannes Gehrke.
Database Management Systems. McGraw-Hill.
- Alfons Kemper and André Eickler.
Datenbanksysteme: Eine Einführung. Oldenbourg Verlag.
- Dennis Shasha and Philippe Bonet.
Database Tuning. Morgan Kaufmann Publishers.
- ...in fact, any book about advanced database topics and internals will do — pick your favorite.

Here and there, pointers (↗) to specific research papers will be given and you are welcome to search for additional background reading. Use Google Scholar or similar search engines.

These Slides...

- ...prepared/updated throughout the semester — **watch out for bugs** and please let me know. Thanks.
- Posted to course web home on the day before the lecture — **bring a printout and take notes.**

Example

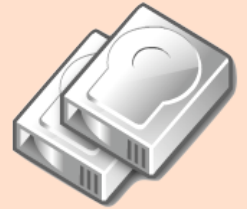
Open Issues/Questions

Take notes.

Code Snippets, Algorithms

DB2 IBM DB2 Specifics

If possible and insightful, discuss how IBM DB2 does things.



Questions?

Comments?

Suggestions?

