

# Architecture and Implementation of Database Systems

Winter 2008/09

Torsten Grust  
Wilhelm-Schickard-Institut für Informatik  
Universität Tübingen



Introduction

Torsten Grust



Architecture of a DBMS

Organizational Matters

# Chapter 1

## Introduction

Preliminaries and Organizational Matters

*Architecture and Implementation of Database Systems*  
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Matters

...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.



- Other 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

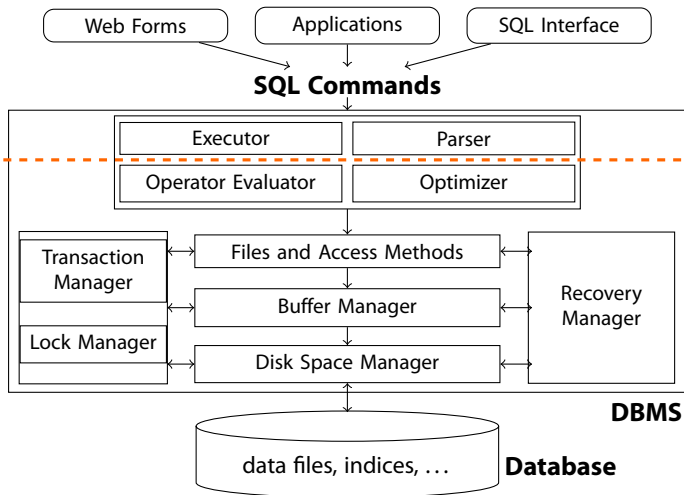
Introduction

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Architecture of a DBMS

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this course

## 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](http://www-db.informatik.uni-tuebingen.de)

Coordinates B318, Sand 13

+49 7071 29-78952 (Monika Weber)

## Lectures

When	Where
Mondays, 13:15–14:45	Sand 6/7, Hörsaal 2
Tuesdays, 15:15–16:45	Sand 6/7, Hörsaal 1

<http://www-db.informatik.uni-tuebingen.de/teaching/ws0809/db2>

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

## Exercises (Manuel Mayr)

When	Where
Thursdays, 15:15–16:45 (starts Oct 23, 2008)	Sand 6/7, Hörsaal 2

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





- **Written exam** toward the end of this semester (we will try to use the 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.



- 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?**