

# Information Systems (Informationssysteme)

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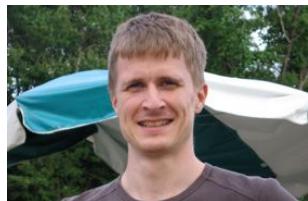
# A Few Words About Me

## Jens Teubner

DBIS Group (LS 6)

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1996–2001 Diploma in Physics, U Konstanz

2001–2005 Research assistant, DBIS Group, U Konstanz

2005–2007 Research assistant, Database Group, TU München

Oct 2006 PhD in Computer Science (XML query processing)

2007–2008 Postdoc, IBM T. J. Watson Research Center, NY, USA

2008–2013 Senior Researcher, Systems Group, ETH Zurich

since 4/2013 Full Professor, DBIS Group, TU Dortmund University

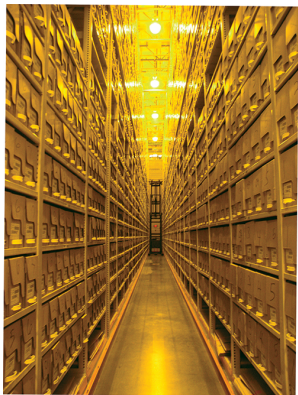
**Topic:** Database systems on modern computing hardware

# The Information Age

**Example:** Library of Congress (<http://www.loc.gov/>)

In 2018:

- **168.3 million items held**
  - 39.6 million books  
(and other print materials)
  - 72.5 million manuscripts
  - recordings, maps, sheet music, ...
- **15,000 items received per day**  
( $\approx 10,000$  are added to collection)
- 1.9 million on-site visitors
- website: 114 million visits,  
498 million page views



**Example:** Amadeus (<https://amadeus.com/>)



In 2019:

- 645+ million bookings
- 1.9+ billion passengers
- each booking preceded by **many** requests for connections and prices

In this course you'll learn how to

## **model, store, and process** data

data in an efficient and scalable manner.

We'll look at

- good ways to **model** your data from an application perspective,
- the role of **database systems**,
- how you **access** and **query** them,
- how **multiple users** can access a database at the same time,
- how a database can guarantee **consistency** and **durability**, and
- what a database does to **find** your data quickly.

## Lecture:

- ~~Wednesdays, 16–18h, Room H.001, Seminarraumgebäude (SRG)~~  
Lecture videos will be provided through Moodle.
- Course website: <http://dbis.cs.tu-dortmund.de/cms/en/teaching/ss20/infosys/>  
Please visit this website **regularly**. We will frequently post new information during the semester.
- Please make sure you **register** for this course in **Moodle**.

## Exercises / Support:

- Organizer: **Thomas Lindemann**  
(thomas.lindemann@cs.tu-dortmund.de)
- Online exercise groups
  - See **course website** for information on how to register.
- Weekly assignments
  - Voluntary (no “Studienleistung”)
  - But you’ll get **feedback** if you **hand them in**.
- We’re there to help you
  - “HelpDesk” chat via <https://riot.fachschaften.org/>
  - Online forum via Moodle
  - Don’t be shy, **email your tutor**.

# Surviving the Exam

There will be a **written exam** (60 min) at the end of the semester.

- dates: **July 22, 2020**; 2nd date: **September 23, 2020**
- **material allowed**: one sheet of A4 paper, **handwritten**

**Note:** The situation around Corona is still highly dynamic. So this information might change at any time.

Best preparation for the exam? Do the exercises!

- Do exercises **before** they are discussed in the group.
- **Hand in** your exercises to get feedback.

“I don’t understand this one thing. I need help!”

- Don’t hesitate to ask me or your TA.
- Use the communication channels on the previous slide.



I will post all **lecture slides** on the course web site;<sup>1</sup> videos will be available via Moodle.

## Good **text books**:

- A. Kemper and A. Eickler. *Datenbanksysteme*. Oldenbourg-Verlag.
- R. Ramakrishnan and J. Gehrke. *Database Management Systems*. McGraw-Hill.
- R. Elmasri and S. B. Navathe. *Fundamentals of Database Systems*. Prentice Hall. (in German: *Grundlagen von Datenbanksystemen*. Pearson Studium.)
- A. Heuer, K.-U. Sattler, and G. Saake. *Datenbanken: Konzepte und Sprachen*. mitp.

... and many more (this is a standard course, taught world-wide).

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<sup>1</sup>Except parts that I mark with  on the slide.

# Experiment with a Database!

I **strongly** recommend you exercise the material of this course on a **real database system**.

## Examples:

- **Oracle** (<http://www.oracle.com/us/products/database/>)
  - Used in the exercises for this course.
  - More details in the exercise groups.
- **IBM DB2** (<https://www.ibm.com/analytics/us/en/db2/>)
  - Full-featured, industry-strength database
  - Available **for free** (Win/Linux)
- **PostgreSQL** (<http://www.postgresql.org/>)
  - Very powerful and feature-rich **open source** database

# Course Outline

- 1 Introduction (this part)
- 2 Overview of database systems
- 3 Database design (3-tier architecture, ER diagrams)
- 4 The relational model (relational algebra, relational calculus)
- 5 SQL (Structured Query Language)
- 6 Normal forms
- 7 Transaction management (ACID properties, serializability)
- 8 Semi-structured data (XML)
- 9 Database implementation (memory hierarchy, B-trees)