

Transaction Processing

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Overview

- 1 Motivation
- 2 Transaction models
- 3 Transaction management
- 4 Advanced transaction models
- 5 Recovery and back-up
- 6 Distributed transactions
- 7 Replication

Required basic knowledge

Databases I:

- Basic principles of database systems
- Tables, attributes, keys
- Relational algebra and SQL

Organization

- Lecturer: Thomas Leich
- Information (Timings, Room) & Slide copies can be found at <http://www.dbse.ovgu.de/Lehre/Lehrveranstaltungen/Transaction+Processing.html>
Lecture: Friday, 15:00 - 17:00 Room: G22 - H2
- Exercise:
 - ▶ Exercise conductor: Sabine Wehnert
 - ▶ Exercise (voluntary):
 - ★ G16 - 215, Monday 11:00–13:00 (Begins: 28.10.2019)
 - ★ Room t.b.a. Thursday 11:00–13:00 (Begins: 7.11.2019)
- Examination:
 - ▶ Oral exam (If less than 35 participants)
 - ▶ Requirement: Registration for exercise
- For feedback and questions:
 - ▶ Room: G29-105 (on appointment)

Underlying Textbook I

Saake, G.; Sattler, K.; Heuer, A.:
**Datenbanken:
Implementierungstechniken.**

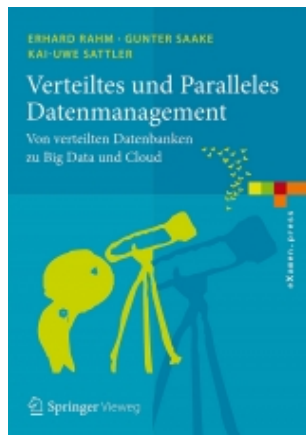
Edition 3, mitp, 2011
644 Pages, 39,95 €
Chapters 8, 9, 10



Underlying Textbook II

Rahm, E.; Saake, G.; Sattler, K.
**Verteiltes und Paralleles
Datenmanagement.
Von verteilten Datenbanken zu
Big Data und Cloud**

Edition 1, Springer, 2015
379 Pages
Chapters 11–15
Available as download!



Literature

For Database Implementation

- Härder, T.; Rahm, E.: *Datenbanksysteme — Konzepte und Techniken der Implementierung*. Springer, 2001
- Garcia-Molina, H.; Ullman, J.; Widom, J.: *Database System Implementation*. Addison-Wesley, 1999.
- Silberschatz, A.; Korth, H. F.; Sudarshan, S.: *Database System Concepts*. Wiley & Sons, 2001.

For Transaction Processing:

- Sippu, S.; Soisalon-Soininen, E.: *Transaction Processing — Management of the Logical Database and its Underlying Physical Structure*. Springer, 2014
- Weikum, G.; Vossen, G.: *Transactional Information Systems — Theory, Algorithms, and the Practice of Concurrency Control and Recovery*. Morgan Kaufmann, 2001
- Gray, J.; Reuter, A.: *Transaction Processing — Concepts and Techniques*. Elsevier, 1992

1. Introduction

1 Roles of Transactions

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1 Roles of Transactions

2 Transactions in the Architecture of a DBMS

Nine capabilities of a DBMS by Codd

- 1 Integration
- 2 Operations
- 3 Catalog
- 4 Views
- 5 **Consistency Control**
- 6 Data Protection
- 7 **Transactions**
- 8 **Synchronization**
- 9 **Recovery**

Transaction properties

A **transaction** is a sequence of operations (actions), which transfers a database from a consistent state into another eventually changed consistent state, applying the **ACID properties**.

- Aspects:

- ▶ Semantic integrity: Correct (consistent) database state after the end of transactions
- ▶ run-time integrity: Avoid errors caused by simultaneous access of several users to the same data