

# Introduction to Databases

## 《数据库引论》



## Lecture 0: Introduction to the Course

### 第0讲：《数据库引论》课程简介

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复旦大学计算机科学技术学院

# 本科计算机专业最重要的课程

- 计算机组成原理 - Computer Architecture and Systems
- 数据结构与算法 - Data Structures and Algorithms
- 操作系统 - Operating Systems
- 编译原理 - Compiler Principles
- 计算机网络 - Computer Network
- 数据库 - Database
- 软件工程 - Software Engineering
- 人工智能 (机器学习与神经网络) - AI (ML+ANN)

编程, 编程, 编程.....Programming, Programming, Programming.....

# Contacting the Instructor

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  - Room D4021, Interdisciplinary Building 2, Jiangwan Campus
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- Homepage: <http://admis.fudan.edu.cn/sgzhou>

# Contacting the TAs

- **Mr. Wenbo Liu (刘文博)**
  - Email: [21210240024@m.fudan.edu.cn](mailto:21210240024@m.fudan.edu.cn)
- **Mr. Yi Guan (官毅)**
  - Email: [23210240015@m.fudan.edu.cn](mailto:23210240015@m.fudan.edu.cn)
- **Mr. Haoran Zhou (周浩然)**
  - Email: [23210240412@m.fudan.edu.cn](mailto:23210240412@m.fudan.edu.cn)
- **Address**
  - Room D4010, Interdisciplinary Building 2, Jiangwan Campus

# Why Study Databases?

- To many data to be handle/manage manually
  - Digital libraries, interactive video, Human Genome project, EOS project
  - Applications' need for DBMS exploding
- Computer usage paradigm shifts from computation to management
- Science research paradigm shifts from hypothesis or experiment-driven to data-driven
- DBMS is an essential system software that supports many systems (Almost everything in the world runs on databases)
- DBMS encompasses most of CS
  - OS, languages, theory, AI, multimedia, logic

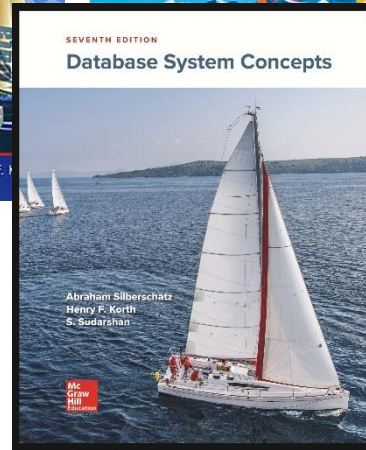
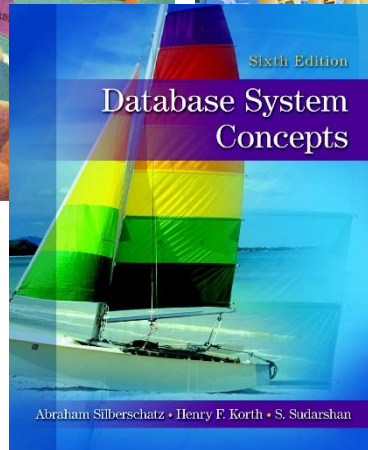
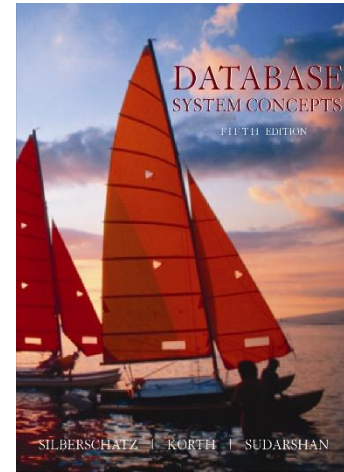
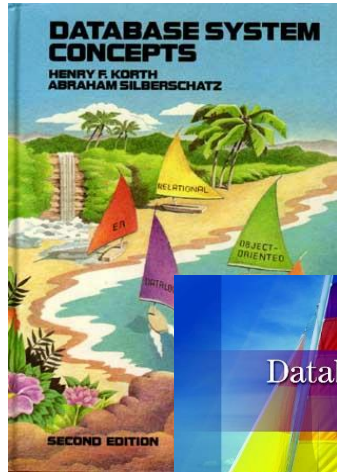
# Course Objectives

- Understand the **foundation** of Relational databases
  - Relational algebra, Functional-dependency theory
- Learn the **major techniques** for building database management systems
  - Query processing and optimization
  - Transaction processing, concurrent control, system recovery
- Master the **basic skills** for designing databases and implementing database applications
  - ER-model, SQL, indexing

Everything you should know so that you can get an industrial job working with relational databases

# Textbook

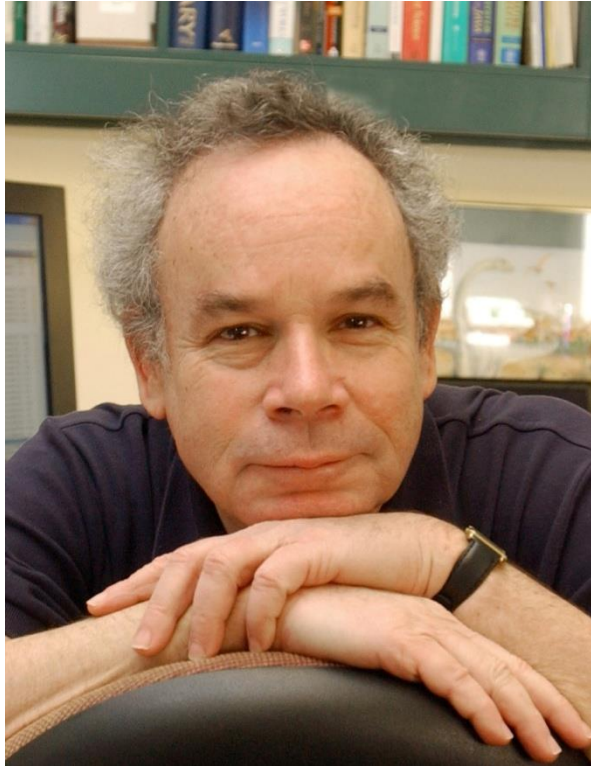
- Abraham Silberschatz (耶鲁), Henry F. Korth (理海大学), and S. Sudarshan (印度理工学院), **Database System Concepts**



2010

2019

## Further about the Textbook and the First Author: Avi Silberschatz

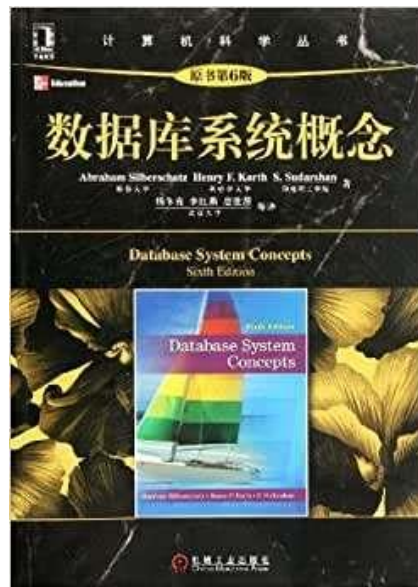
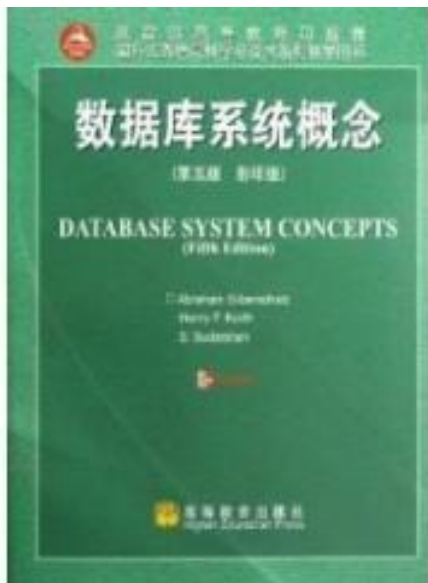


- Sidney J. Weinberg Professor of Computer Science & Chair of the Comp.Sci. Department at **Yale University**
- a **Fellow** of the Association of Computing Machinery (**ACM**), a **Fellow** of Institute of Electrical and Electronic Engineerings (**IEEE**), a **Fellow** of the American Association for the Advancement of Science (**AAAS**), and a **member** of the Connecticut Academy of Science and Engineering.
- <http://codex.cs.yale.edu/avi/>
- Text book URL: <http://www.db-book.com/>



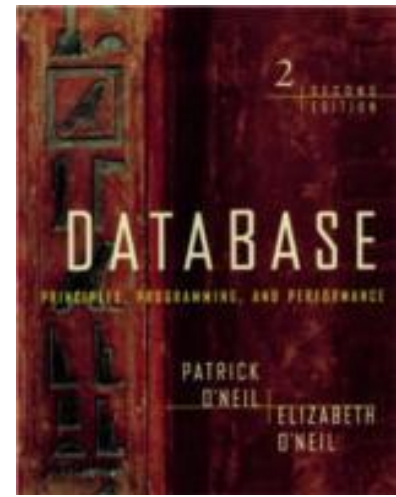
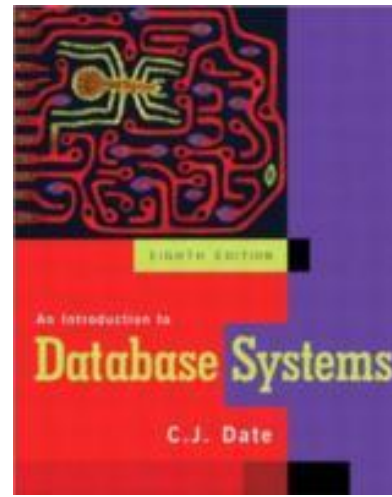
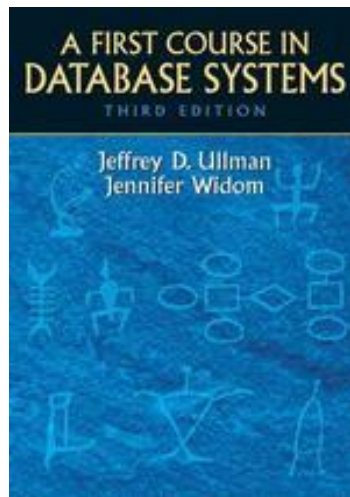
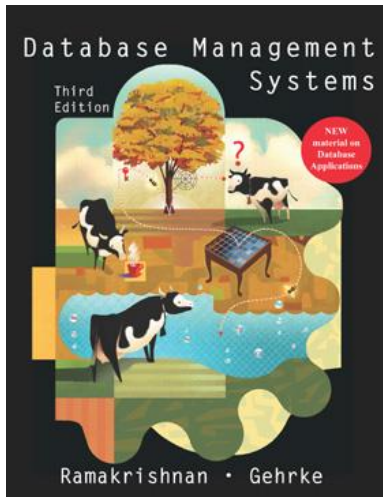
# Textbook (Chinese Editions)

- Abraham Silberschatz (耶鲁), Henry F. Korth (理海大学), S. Sudarshan (印度理工学院), Database System Concepts (6th edition), 2011
- 中文版 (第6版/第7版) , 北京大学杨冬青等译, 2012/2021



# Other References

- Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems (3<sup>rd</sup> Edition)*, McGraw-Hill, 2007/2012 **CTO Microsoft**
- Jeffrey D. Ullman and Jennifer Widom, *A First Course in Database Systems (3<sup>rd</sup> Edition)*, Prentice Hall, 2008
- Date C J, *An Introduction to Database System (8<sup>th</sup> edition)*, Addison-Wesley, 2003
- Patrick O'Neil and Elizabeth O'Neil, *Database: Principles, Programming, and Performance (2<sup>nd</sup> Edition)*, Morgan Kaufmann, 2000



# Course Time and Venue

- Time
  - 1:30pm-4:10pm
  - Every Thursday, from Feb. 29 to Jun. 14

- Venue
  - H3201



# Outline of the Course

- **Part 0: Overview**
  - **Lect. 0/1 (Feb. 29)** - Ch1: Introduction
- **Part 1 Relational Databases**
  - **Lect. 2 (Mar. 7)** - Ch2: Relational model (data model, relational algebra)
  - **Lect. 3 (Mar. 14)** - Ch3&4: SQL (Introduction and intermediate)
  - **Lect. 4 (Mar. 21)** - Ch5: Advanced SQL
- **Part 2 Database Design**
  - **Lect. 5 (Mar. 28)** - Ch6: Database design based on E-R model
  - **Apr. 4 (Tomb-Sweeping Day): no course**
  - **Lect. 6 (Apr. 11)** - Ch7: Relational database design
- **Midterm exam: Apr. 18**
- **Part 3 Data Storage & Indexing**
  - **Lect. 7 (Apr. 25)** - Ch12/13: Storage systems & structures
  - **Lect. 8 (May 3 -> Apr. 28)** - Ch14: Indexing
- **Part 4 Query Processing & Optimization**
  - **Lect. 9 (May 10)** - Ch15: Query processing
  - **Lect. 10 (May 17)** - Ch16: Query optimization
- **Part 5 Transaction Management**
  - **Lect. 11 (May 24)** - Ch17: Transactions
  - **Lect. 12 (May 31)** - Ch18: Concurrency control
  - **Lect. 13 (Jun. 7)** - Ch19: Recovery system
- **Part 6 DB Systems & Course Review**
  - **Lect. 14 (Jun. 14)**

**Final exam: 13:00-15:00, Jun. 26**

# Grading Scheme

- Attendance & assignments (20%)
- Course project (30%)
  - Lab course attendance
  - Project: develop a database application
    - ✓ Database design
    - ✓ Front-end development
- Midterm exam (20): April 18
- Final exam (30%): June 26

# Other Useful Materials

- **Conferences Proceedings**
  - SIGMOD / PODS, VLDB, ICDE
  - ICDT, EDBT, ER, DASFAA, SSTD, etc.
- **Journals**
  - ACM Transactions on Database Systems (TODS)
  - IEEE Trans. on Knowledge and Data Engineering (TKDE)
  - VLDB Journal
  - Data and Knowledge Engineering (DKE), etc.
- **The Internet resources**
  - DBLP: <http://dblp.uni-trier.de/>
  - Google Scholar, Citeseer, etc.

# Course Website and WeChat Group

- **Course website (coming soon)**
  - You can download all ppts of the course
- **Course Wechat group**
  - We will set up a course Wechat group to facilitate Q/A and exchange between students and the instructor and TAs

# How to succeed in the Course?

- Attend the main course and lab course
- Read the textbook and review ppts of the course
- Finish the assignments on time
- Do your best to complete the project and deliver an excellent summary report
- Prepare well for the exams



# Punishment Policy

- **Plagiarism or cheating** in assignments, course project, and examinations is absolutely unacceptable. Once found, your grade will be definitely set to **Fail ! NO ChatGPT/GPT!**

# Important Messages

- Homework must be finished and submitted before 12:00pm of the next **Wednesday** after assigned
- We accept only electronic copy of homework
- Finished homework should be submitted to the TAs by email or the e-hall system (TBD)

End of Lecture 0