

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 - Databases
- 软件工程 - Software Engineering
- 人工智能（机器学习与神经网络） - AI (ML+ANN+LLM)

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

Contacting the Instructor

- Prof. Zhou Shuigeng (周水庚)
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Contacting the TAs

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- Address
 - Room D4010, Interdisciplinary Building 2, Jiangwan Campus

Why Study Databases?

- To many data to be handle/manage
 - 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, algorithms, AI, multimedia, logic

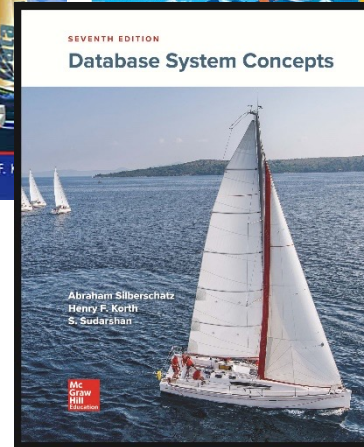
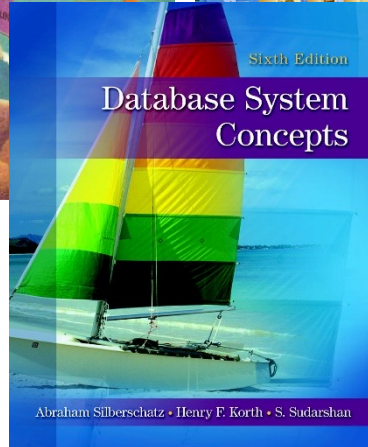
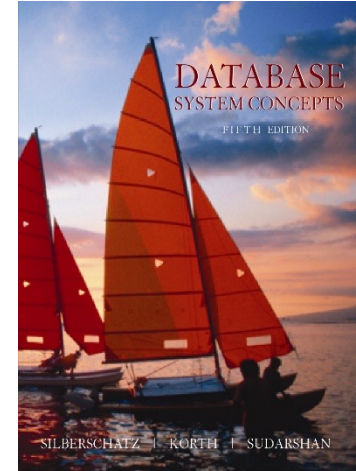
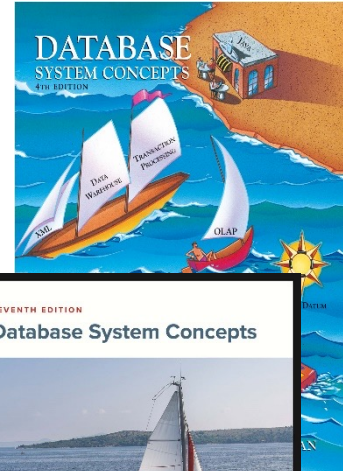
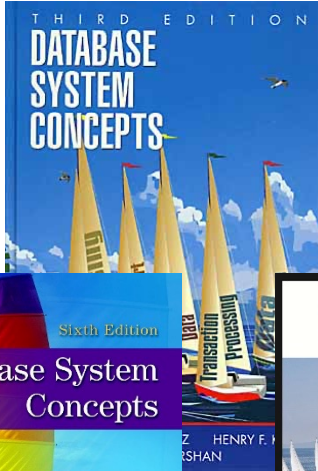
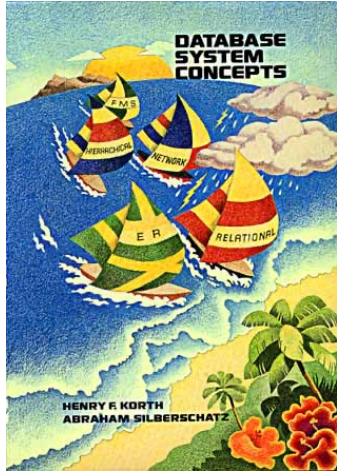
Course Objectives

- 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 developing database applications
 - ER-model, SQL, indexing

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

Textbook

- Avi (Abraham) Silberschatz (耶鲁), Henry F. Korth (理海大学), and S. Sudarshan (印度理工学院), **Database System Concepts, 7nd ed., 2019.**
- Text book URL: <http://www.db-book.com/>



2010

2019

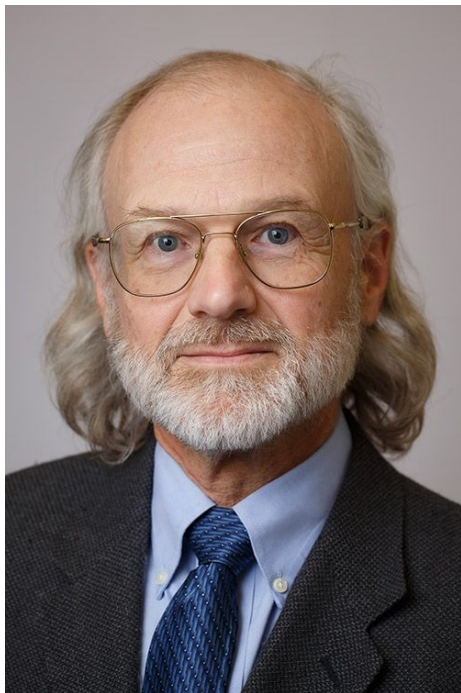
About the First Author: Avi Silberschatz



<http://codex.cs.yale.edu/avi/>

- Sidney J. Weinberg Professor of Computer Science & Chair (2005-2011) 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 Engineers (**IEEE**), a **Fellow** of the American Association for the Advancement of Science (**AAAS**), and a **member** of the Connecticut Academy of Science and Engineering
- Received
 - ✓ 2002 IEEE Taylor L. Booth Education Award,
 - ✓ **2019 VLDB Test of Time Award**
 - ✓ 1998 ACM Karl V. Karlstrom Outstanding Educator Award
 - ✓ **1997 ACM SIGMOD Contribution Award**

About the Second Author: Henry F. (Hank) Korth



- Professor in the Department of Computer Science and Engineering at **Lehigh University**
- a **Fellow** of the ACM and the IEEE
- At the 1995 International Conference on Very Large Data Bases, his paper "A Model of CAD Transactions" was chosen as "**Most Influential Paper from the Proceedings of Ten Years Ago.**"
- <https://www.cse.lehigh.edu/~korth/>

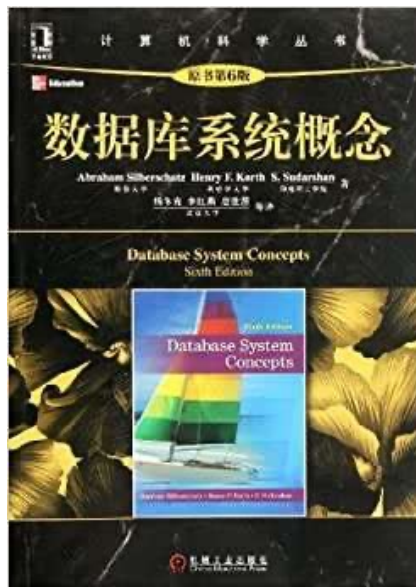
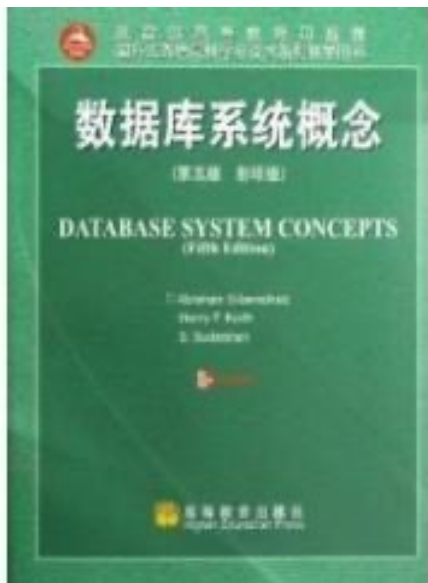
About the Third Author: S. Sudarshan



- Subrao M. Nilekani Chair Professor
Dept. of Computer Science and
Engineering, **IIT Bombay**
- Professional History
 - ✓ B.Tech. (Computer Science) IIT Madras, 1983-1987
 - ✓ Ph.D. (Computer Science) Univ. of Wisconsin-Madison, 1987-1992
 - ✓ Member of Technical Staff Database Research Group, Bell Laboratories, Murray Hill, NJ, 1992-1995
 - ✓ IIT Bombay, 1995-
- <https://www.cse.iitb.ac.in/~sudarsha/>

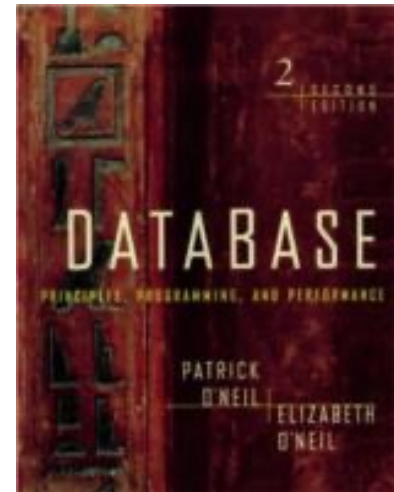
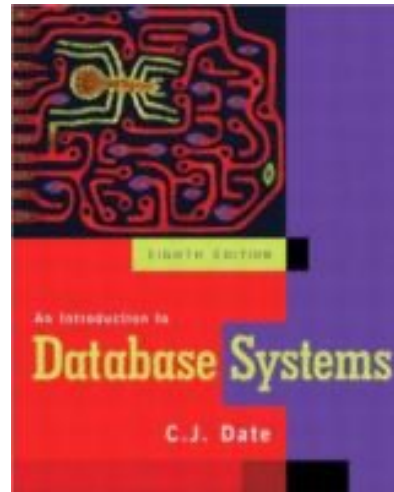
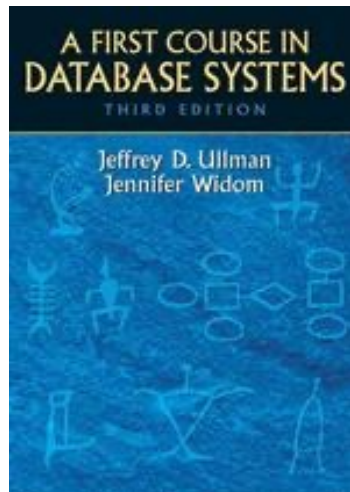
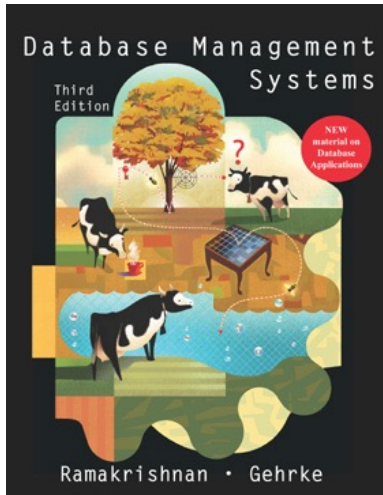
Textbook (Chinese Editions)

- 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* (3rd Edition), McGraw-Hill, 2007/**2012 CTO Microsoft**
- Jeffrey D. Ullman (**2020 Turing Award laureate**) and Jennifer Widom, *A First Course in Database Systems* (3rd Edition), Prentice Hall, 2008
- Date C J, *An Introduction to Database System* (8th edition), Addison-Wesley, 2003
- Patrick O'Neil and Elizabeth O'Neil, *Database: Principles, Programming, and Performance* (2nd Edition), Morgan Kaufmann, 2000



Course Time and Venue

- Time
 - 1:30pm-4:10pm
 - Every Thursday, from Feb. 20 to Jun. 5
- Venue
 - HGX410



Content of the Course

- **Part 0: Overview**
 - **Lect. 0/1 (Feb. 20)** - Ch1: Introduction
- **Part 1 Relational Databases**
 - **Lect. 2 (Feb. 27)** - Ch2: Relational model (data model, relational algebra)
 - **Lect. 3 (Mar. 6)** - Ch3&4: SQL (Introduction and intermediate)
 - **Lect. 4 (Mar. 13)** - Ch5: Advanced SQL
- **Part 2 Database Design**
 - **Lect. 5 (Mar. 20)** - Ch6: Database design based on E-R model
 - **Lect. 6 (Mar. 27)** - Ch7: Relational database design (Part I)
 - **Lect. 7 (Apr. 3)** - Ch7: Relational database design (Part II)
- **Midterm exam: Apr. 10**
- **Part 3 Data Storage & Indexing**
 - **Lect. 7 (Apr. 17)** - Ch12/13: Storage systems & structures
 - **Lect. 8 (Apr. 24)** - Ch14: Indexing
- **Part 4 Query Processing & Optimization**
 - May 1, holiday, no classes
 - **Lect. 9 (May 8)** - Ch15: Query processing
 - **Lect. 10 (May 15)** - Ch16: Query optimization
- **Part 5 Transaction Management**
 - **Lect. 11 (May 22)** - Ch17: Transactions
 - **Lect. 12 (May 29)** - Ch18: Concurrency control
 - **Lect. 13 (Jun. 5)** - Ch19: Recovery system
 - **Lect. 14 (Jun. 5)** - Course review

Final exam: 13:00-15:00, Jun. 18

Lab Time and Venue

- Time
 - 8: 00 - 9: 00
 - Every Friday from Feb. 21 to Jun. 6
- Venue: R302 & 305, Yifu Building, Handan Campus



Content of Lab

- Goal: training the students to use database systems and develop simple DB applications
- TAs will give courses on
 - DB application development tools, languages and environments
 - DB design tools, MySQL, front-end development tools etc.
 - Ch. 8 & 9 in the textbook
 - Introducing typical Advanced DBMSs
- Project: developing a simple DB application
 - From ER model design to RDB design, using SQL to retrieve data from a DB
 - HCI interface development
 - Finishing **individually or by a group with at most two students**

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 10
- Final exam (30%): June 18

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 ppts of the course
- Finish the assignments on time
- Finish the project and deliver an excellent 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/DeepSeek!**

Important Messages

- Homework must be finished and submitted via **ehall** system before 12:00pm of the next **Wednesday** after assigned
- We accept only electronic copy of finished homework

End of Lecture 0