

# The Principle of Database System (Lecture CS022)

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# Lecture Time & Grading

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## *Time:*

*Tuesday 10.00AM-11.40AM Week 9th ~ 16th*

*Thursday 8.00AM-9.40AM Week 1th ~ 16th*

*Final Exam: 17<sup>th</sup> or 18<sup>th</sup> week*

Place: 东中院3-103

## **Grading:**

Attendance & Homework: 30%

Final Examination: 70%

# Textbook

A first course in database systems (Third Edition)

Authors: Jeffrey D.Ullman, Jennifer Widom

Stanford University



书名：[数据库系统基础教程（英文版·第3版）](#)

ISBN：7-111-24733-3

原书名：A First Course in Database Systems  
Third Edition

丛书名：[经典原版书库](#)

作者：Jeffrey D. Ullman; Jennifer Widom

译者：无

出版日期：2008-07-26

页数：565

价格：¥ 45.00

机械工业出版社

[www.china-pub.com](http://www.china-pub.com)

# Reference Books

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- 1) **Readings in database systems** (fifth edition 2015) already online at course site.
- 2) **Database System Implementation** (**Stanford university**) Chinese and English version (机械工业出版社)
- 3) **An introduction to Database System** 数据库系统概论 高等教育出版社 (**中国人民大学** 萨师煊, 王珊)

# Contents of the Textbook

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Database **Modeling** and **Programming**:

- **Relational Database Modeling**

Basic concepts, design theory, high level models (E/R model, UML, ODL)

- **Relational Database Programming**

Relational algebra and Datalog, SQL

- **Semi-structured Data Modeling and Programming**

XML and query languages for XML

# Content 1:

## Database Modeling

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- Relational model of data (chapter 2)
- Design theory for relational model (chapter 3)
- High-level database model (chapter 4)

E/R model, UML, ODL and

E/R, UML, ODL → relational models

# Content 2: Relational database programming

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- Abstract programming language (**chapter 5**) : algebra and logic
- The Standard Database Language SQL:
  1. DML introduction (**chapter 6**)
  2. Constraints (**chapter 7**)
  3. Views and indexes (**chapter 8**)
  4. SQL in a server environment (**chapter 9**)
  5. Advanced topics in relational databases (**chapter 10**)

# Content 3: Modeling and Programming for semi-structured data

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- Semi-structured data model  
(chapter 11)
- Programming language for XML  
(chapter 12)



# Turing Awards in DB

<https://amturing.acm.org/byyear.cfm>

- 1973: Charles W. Bachman for creating a **network database system** (Integrated data store IDS) death on July 13, 2017
- 1981: Edgar F. Codd for **a relational model of data.** Death on April 18, 2003
- 1998: James Gray for **system R, transaction processing** research and **granularity of Locks and Degrees of Consistency.** 2007 disappeared and death in 5 years .
- 2014: Michael Stonebraker for **Ingres system**, the source of commercial database systems, and innovative ideas such as column store, OLAP, stream data, big data and so on.

# Aim of the course

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- **Basic concepts** (what is DBMS? What is Database system?...)
- **Design of database** (how does one build a useful database? What kind of information is stored in database? What is the structure of data?)
- **Database Programming** (how to query and operate on database?)
- **New trend** of database management

# Application: a student-course management system

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- The university has a number of **courses** in many **departments**. Each course is taught by a **teacher** in some specific department.
- A student can **select** a course to take, can **update** his course list, or **query** his grades of the courses he took. A teacher can ...

# How to implement the system ?

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- How to **describe** students, teachers, courses... in real world?
- How to **structure** those data?
- How to **select** a course to take? **delete** a course?
- How to **query** his grades of the courses he took?
- How to **make a constraint** of a course for no more than 80 students?

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We will learn it in this  
course

Any Questions?