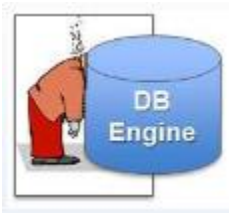
CMPT 606– Advanced Database

Syllabus and Course Admin



Dr. Abdelkarim Erradi

Department of Computer Science & Engineering

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Outline

- Course introduction
- Logistics
- Introduction of the students

About the Instructor

- **Dr. Abdelkarim Erradi**
  - **Office:** Office 132, Female Engineering Building
  - **Phone:** 4403 4254
  - **Office hours:**
    - Tuesday 4pm to 5pm at CSE meeting room
    - You can talk to me after class if you have issues/questions
  - **Best way to contact me is by Email**

erradi@qu.edu.qa

Course learning outcomes

1. Model and implement a database application using relational and non-relational database management systems.
2. Explain and apply approaches for improving a database's performance, including the use of indexes and query optimization.
3. Explain and discuss database mechanisms for achieving Atomicity, Consistency, Isolation, and Durability.
4. Critically discuss different architectures for distributed databases, database future trends and emerging applications.

Schedule

1. Database concepts and Architecture [1]
2. Data modeling [1]
3. Storage and database file organization [1]
4. Indexing techniques [2]
5. Query processing and optimization [2]
6. Concurrency control techniques [1]
7. Database recovery techniques [1]
8. Introduction to NoSQL and NewSQL databases [1]
9. Document-Oriented Database [1]
10. Graph Database [1]
11. Database future trends (e.g., Stream Processing, Spatiotemporal data, Data Management for Microservices and Cloud data services) [2]

[?] number of weeks

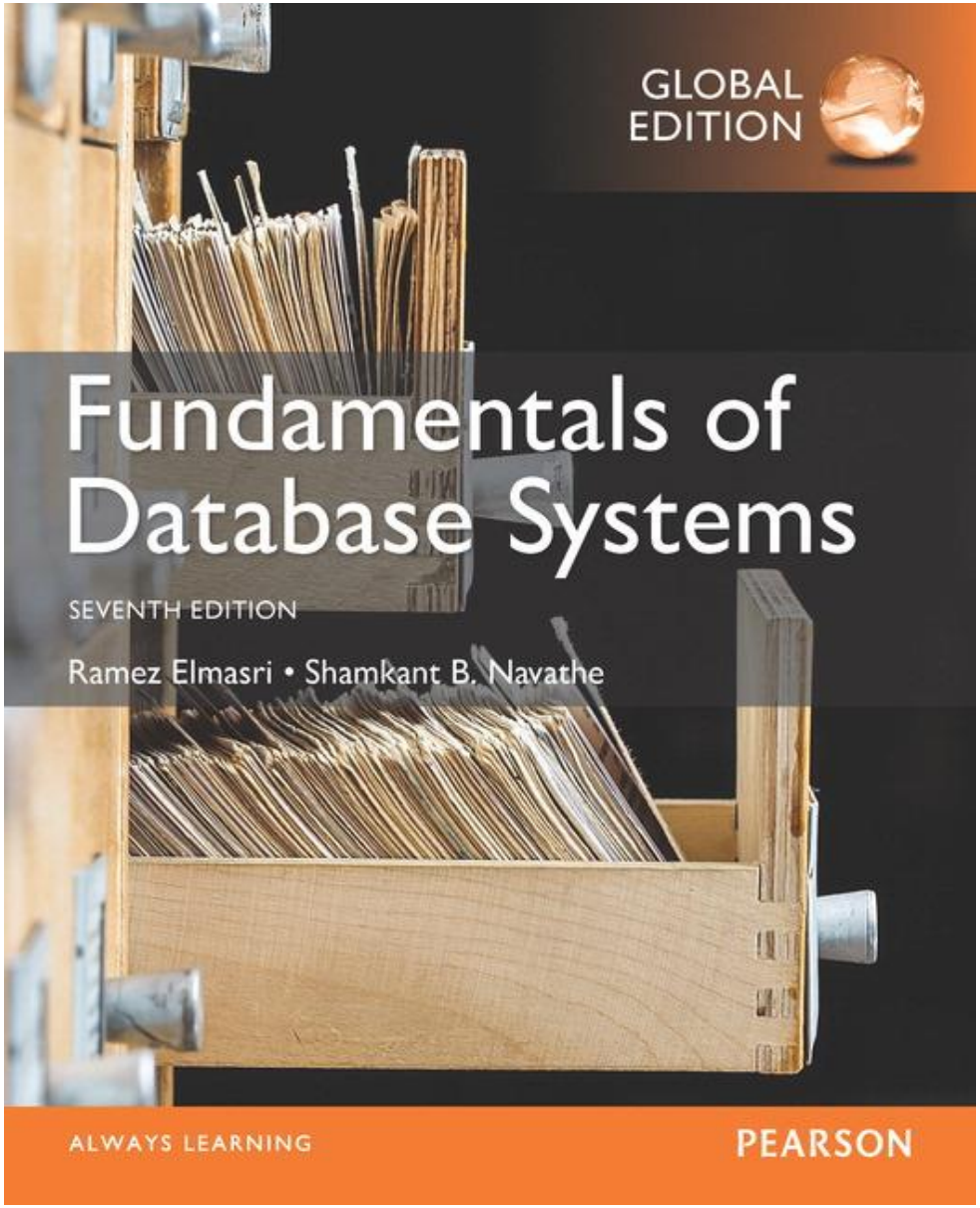
The Textbook

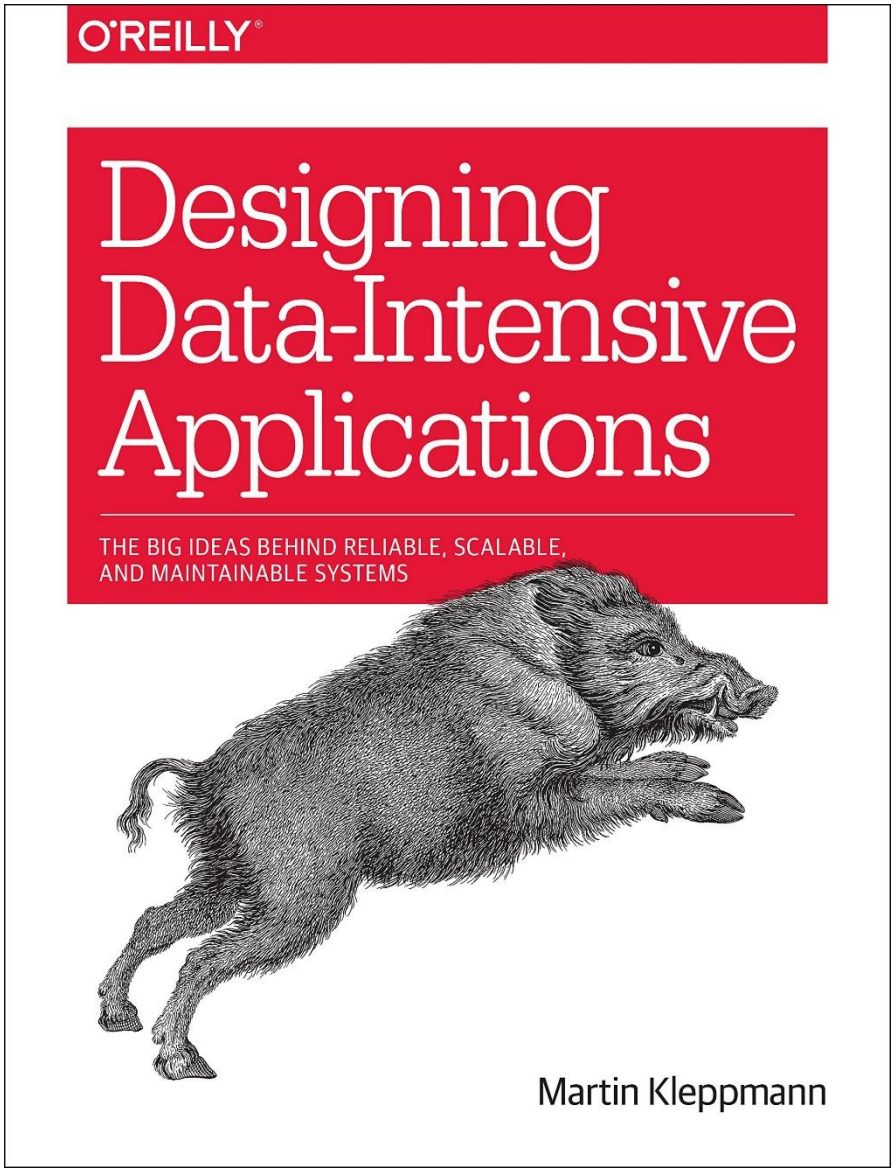
Elmasri, R. and S. B. Navathe

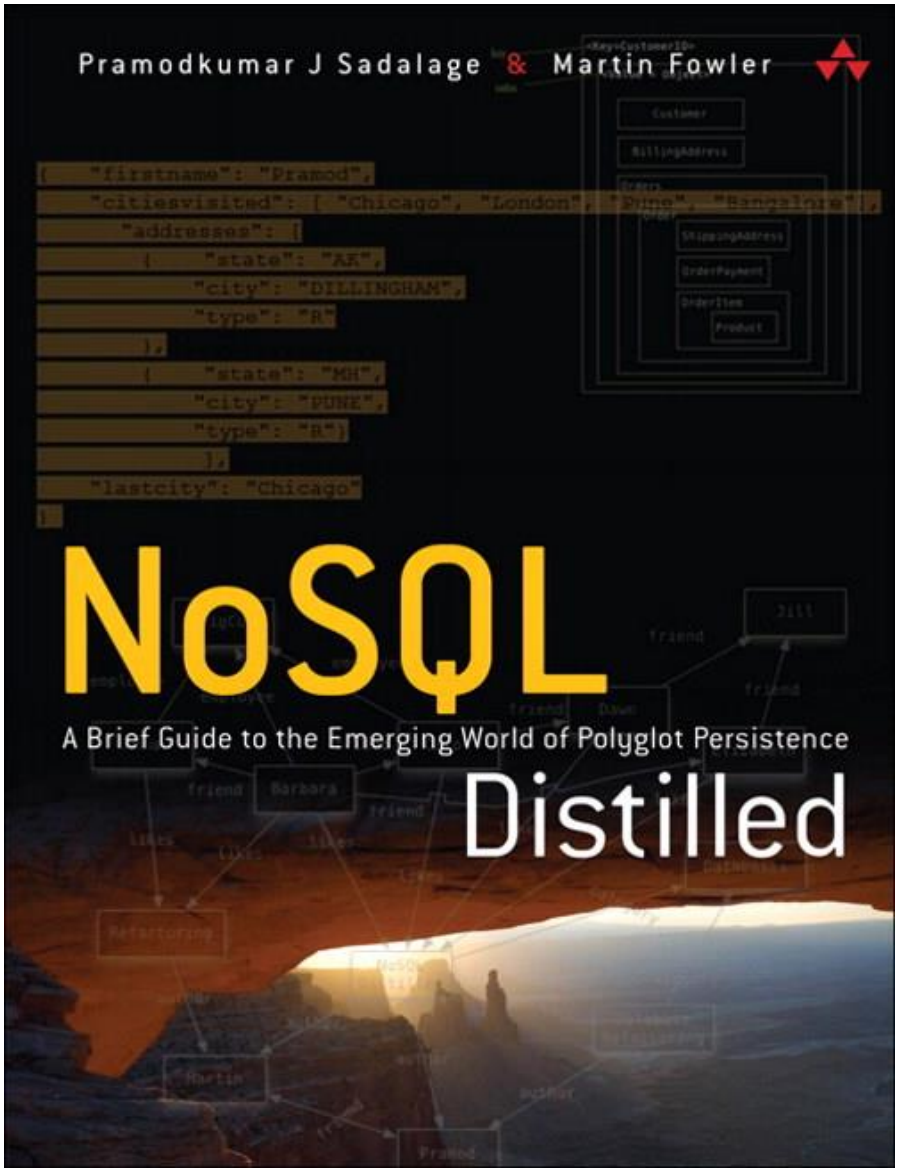
Fundamentals of Database Systems,

7th Edition,

Pearson Education, 2017




O'REILLY
Designing Data-Intensive Applications
THE BIG IDEAS BEHIND RELIABLE, SCALABLE, AND MAINTAINABLE SYSTEMS
Martin Kleppmann


Pramodkumar J Sadalage & Martin Fowler
NoSQL
A Brief Guide to the Emerging World of Polyglot Persistence
Distilled

Your Grade is Based on:

Homework	**15%**	3 assignments
Review Paper and presentation	**15%**	Review paper (10%) and Presentation (5%)
Project	**30%**	**3 phases project:** - Relational DB design and implementation (10%) **– Week 4** - MongoDB design and implementation (10%) **– Week 8** - Neo4j design and implementation (10%) **– Week 12**
Midterm exam	**20%**	Week 7
Final exam	**20%**	Consult the University exam timetable

Review Paper Scope - Draft

- Brief overview of the selected DB technology
- Database architecture
- Programming Language Interface
- Data Model + Operators
- Database strategies for Scalability, Availability, and Consistency
- Deep evaluation: advantages and limitations
- Comparison with the Relational Model in terms of: Data modeling, Scalability, Consistency, Partitioning, Storage layout, Querying, and Distributed data processing
- General use cases where it can be used
- Real use cases where it has been used
- How to migrate from RDMS to the selected NoSQL database

How to succeed in this course….

- Do your weekly textbook assigned reading
- **Read the slides before you come to the class**
- **Practice and explore as many examples as possible**
  - Understand and enhance the demos and examples I provide as well as the ones in the textbook
- **Attend and participate in class**
  - **Many of the exam questions are from the class explanation**
- Do all the assignments and projects **yourself**
- Seek help EARLY during lectures and office hours

Important Notes

- This is a Master course and students are expected to learn independently as much as needed in order to complete the course requirements
- Do not expect me to find/fix your code bugs
- Do not expect me to find and fix your technical issues
- I can only give you high level suggestions and guidance

Plagiarism / Cheating

- “Getting an unfair academic advantage"
  - using other people's work as your own
  - Not doing your assignments yourself
- **Do your homework and project yourself**
  - Do NOT copy from each other or from the Internet **I will know it!**
  - **Cite** any references / code used
- Penalties START with a zero on the assignment, failing the course! and other disciplinary actions as per QU policy

Class URL

- ***Course Content and Student work submissions @*** https://github.com/cmpt606f19/cmpt606-content
- **Announcements will be by Email**

- When emailing, please add '**CMPT 606'** to the email title

e.g., **CMPT 606** – Request for a meeting

Software we will use

- You can use any relational database such as **SQL Server 2017 Express**

  https://www.microsoft.com/en-us/sql-server/sql-server-downloads/

- Many NoSQL databases such as MongoDB, Neo4j …
- **Visual Paradigm** for Entity-Relationship (ER) model
- For implementation you can use any language such as Python, JavaScript, Java, C#, ...

What to do next

- Read Chapters 1 and 2 of the textbook
- **Email me your group members (student Ids and names)**
- Select the DB topic you would like to work on

Introduce yourself

- Name
- Current job (optional)
- DB experience
- What do you hope to learn from this course?