CS363: INTR DATABS MGT SYS

Instructor: Qi Li

Department of Computer Science
Iowa State University
qli@iastate.edu
Office: Atanasoff 102

Course Resources

- Instructor: Qi Li
  - Class hours: TT 9:30-10:50 am
  - Office hours @ 102 Atanasoff Hall
    - TT 10:50 - 11:59 am
    - Appointment
- TA office hours: see the syllabus on canvas

- Course website: Canvas
  - Announcements, lecture slides, posting and submission of homeworks, grades, etc.

Need help and/or discussions

◆ Sign on: Piazza http://piazza.com/iastate/spring2020/coms363

◆ Peer discussion, TA announcement, Q&A, etc.

◆ Bonus points will be rewarded to top 5 contributors on Piazza

◆ You are encouraged to form study groups. (But do your assignments independently)

◆ **Do not accumulate your questions!**

◆ We are not able to answer

- I have a runtime error. Here is my code. Can you tell me where is wrong?
- The assignment asks me to design the algorithm. Can you give me the pseudo code?
- I don't understand database.

◆ We are happy to answer

- I have this error message when I want to do this. I tried this and that to debug, but can't solve my problem.
- I am confused with XX concept. Can you give me an example?
- How to calculate XX?
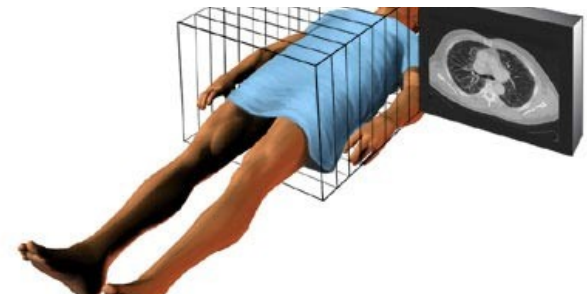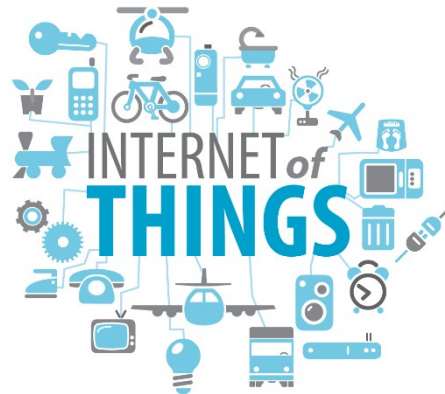
Course Improvement Project

- Volunteer to join (~3 students)
- Propose:
  - Upload lecture notes
  - Polish slides
  - Feedback

My Background

- Data mining
  - Applied machine learning
  - Database and data warehousing

Database

- A collection of related data [Elmasri]
  - A database represents some aspects of real world called "miniworld" [Elmasri] or "enterprise" [Ramakrishnan]
  - A database can be of any size and of varying complexity
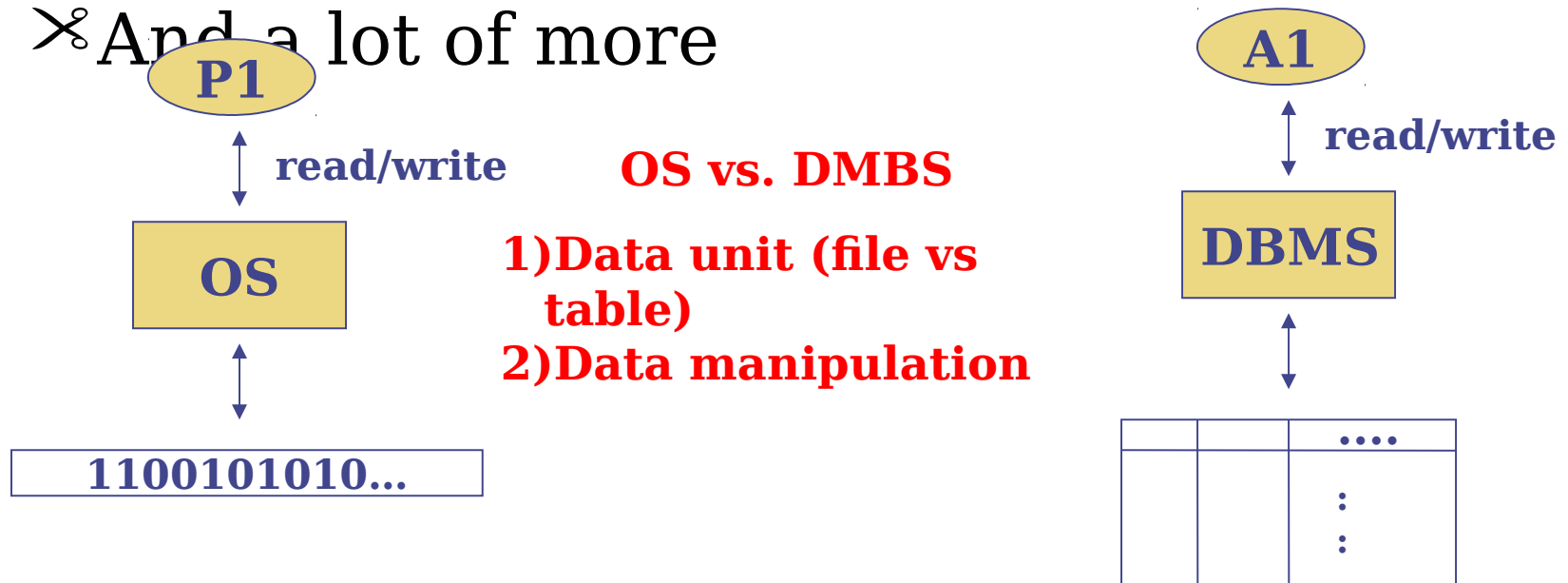 - It may be generated and maintained manually or using computers

Database Management System (DBMS)

- A software package designed to store and manage databases
  - Relational DBMSs: MySQL, DB2, Informix, Oracle, Microsoft Access, Microsoft SQL Server, FoxBase, Paradox
  - Graph DBMSs: Neo4j

Why DBMS?

✂ Data is large, extremely large, beyond the limitation of general-purpose operating systems

✂ Allow users to manipulate the data in a convenient way

✂ Index data for efficient data retrieval

✂ And a lot of more

P1

↕ **read/write**

OS

↕

1100101010…

OS vs. DMBS

1) Data unit (file vs table)

2) Data manipulation

A1

↕ **read/write**

DBMS

↕

…

Why taking this course?

BEST TECHNOLOGY JOBS

- **#1** Software Developer
- **#2** Computer Systems Analyst
- **#3** IT Manager
- **#4** Information Security Analyst
- **#5** Database Administrator

Average Salary by Degree/Major Subject for Skill: Big Data Analytics

Salary		Hourly Rate

Big Data Analytics Median Salary by Degree/Major Subject

Check salary info for y

More Charts

Degree/Major Subject	Average	$0
Bachelor of Science (BS / BSc) 1191 profiles	$99,578	
Master of Science (MS) 792 profiles	$99,908	
Bachelor of Arts (BA) 576 profiles	$91,477	

BEST JOBS U.S.News RANKINGS

Database Administrator Overview

Overall Score 6.5 / 10

#5 in **Best Technology Jobs** | **#22** in **Best STEM Jobs** | **#48** in **100 Best Jobs**

Overview	Salary	Reviews and Advice	Job Openings

What is a Database Administrator?

Database administrators – DBAs, for short – set up databases according to a company's needs and make sure they operate efficiently. They will also fine-tune, upgrade and test modifications to the databases as needed.

With information so readily available in this era of apps, tablets and social media, data has become the new treasure organizations must protect and cherish. More than anyone else, database administrators are relied on as the guardians of this treasure, implementing security measures to ensure sensitive data doesn't fall into the hands of unruly pirates while also managing the

MEDIAN SALARY
$87,020

UNEMPLOYMENT RATE
1.1%

Database Applications Developer Salaries

13,974 Salaries   Updated Jun 3, 2019

Industries	Company Sizes	Years of Experience

Average Base Pay

$76,195 /yr

$58K Low	$76K Average	$117K High

Additional Cash Compensation (?)

Average	$5,564
Range	$1,400 - $14,394

How much does a Database Applications Developer make?
The national average salary for a Database Applications Developer is $76,195 in United States. Filter by... More
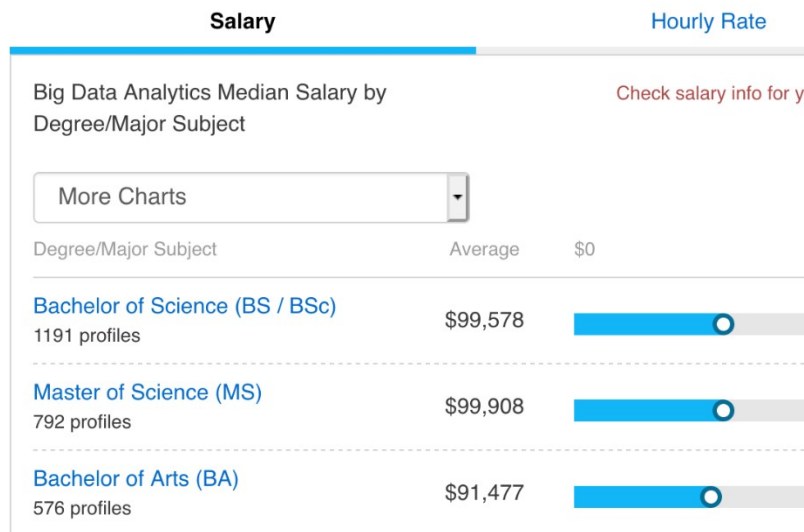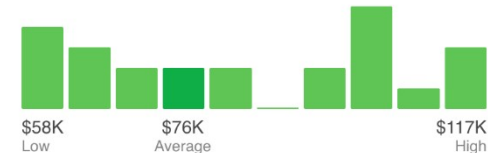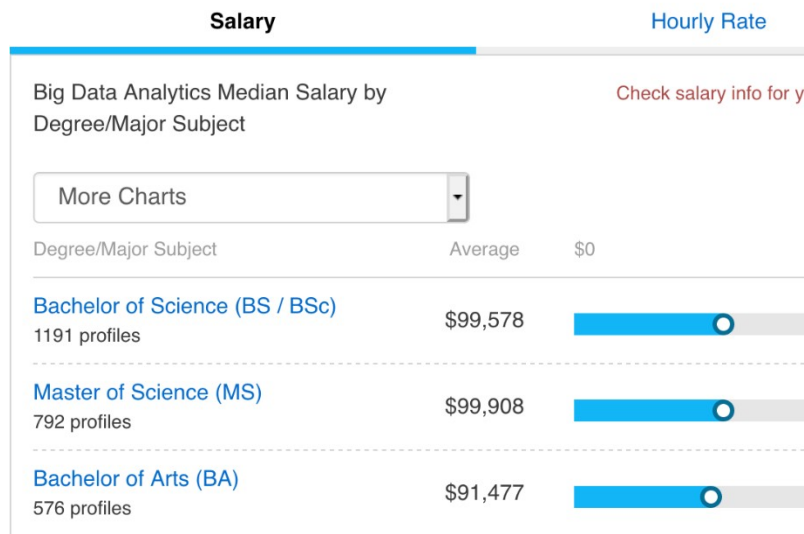
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- #2 Computer Systems Analyst
- #3 IT Manager
- #4 Information Security Analyst
- #5 Database Ad...

Average Salary by Degree/Maj... ... ...g
Data Analytics

	Salary	Hourly Rate

Big Data Analytics Median Salary by Degree/Major Subject

Check salary info for y

More Charts		▼
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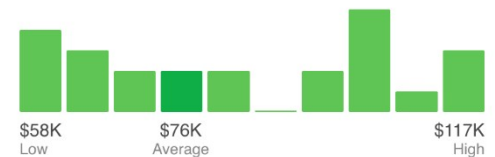## Database Applications Developer Salaries

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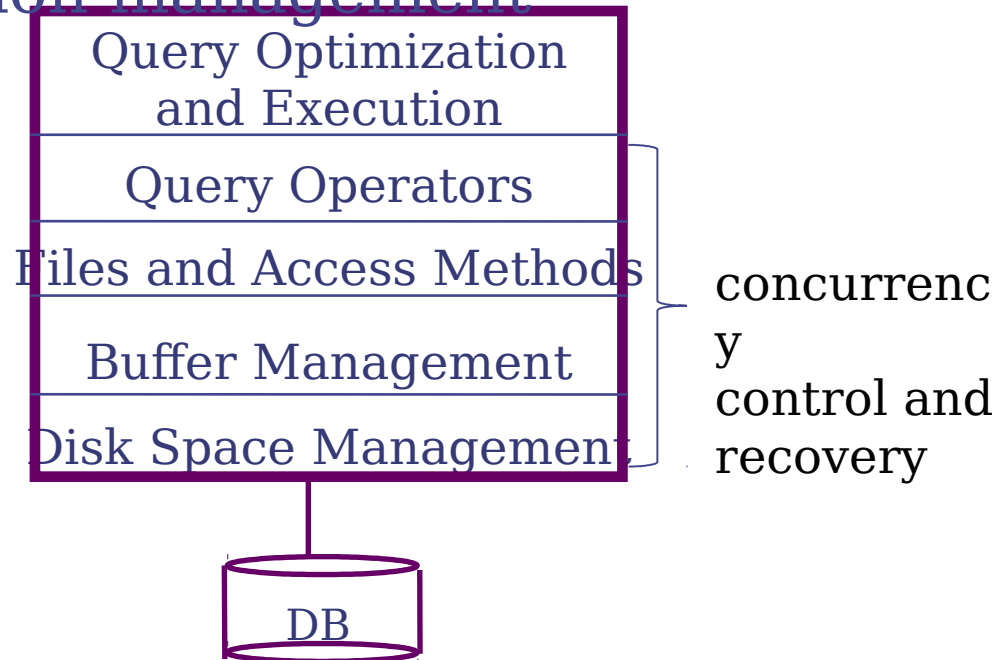
Objectives

- Provide students with necessary background for
    - Designing and implementing database applications using some commercial DBMS
    - Understanding the internal implementation of a typical DBMS

Topic Coverage: Part 1

- Design and implementation of database applications
  - Entity-Relationship (ER) model
  - Relational data model and mapping from ER-to relations
  - Implementation of the design of a database application
  - Functional dependencies and normalization

Topic Coverage: Part 2

- Internal of database management systems
  - Storage management
    - Implementation and cost estimation of basic operators
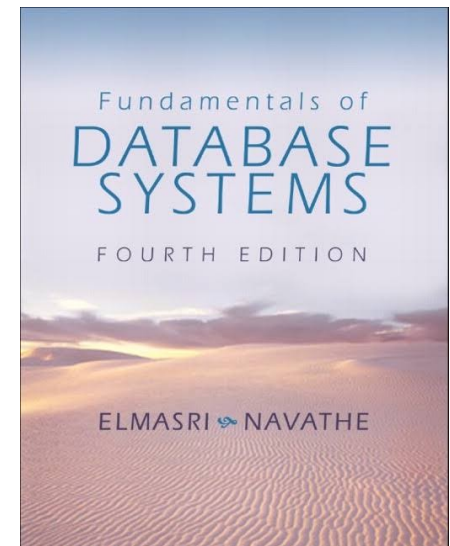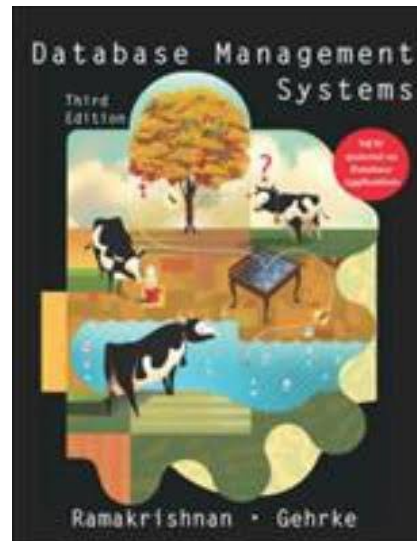   - Relational algebra and query optimization
    - Transaction management

| Query Optimization and Execution |
| Query Operators |
| Files and Access Methods |
| Buffer Management |
| Disk Space Management |

concurrency control and recovery

DB

Topic Coverage: Part 3

- Advanced topics (on-going research)
  - Data mining
  - Internet information retrieval

Course Materials

- Required
  - Lecture notes available from Canvas
  - Supplemental in-class materials (may not be available from Canvas)

- Recommended

Mutual Contract

- Instructor
    - I will provide information about database principles and practice to the best of my knowledge
    - I will uphold my professional ethics
- Students
    - I will participate in this course and practice concepts learned through lectures, assignments, exams, and projects to the best of my ability
    - I will uphold academic honesty, professional ethics and be a good class and world citizen

Other Policies

- **Academic Honesty**
  - Students who plagiarize other work in any part of assignment/tests will receive F as the letter grade for this course, and will be reported to the university.

- **Disability**
  - If you have a documented disability and anticipate needing accommodations in this course, please make arrangements to meet with me soon.

How to perform well

- You are adults!!!
- Attend lectures
  - No class attending required, but you are required to know everything covered in lectures

- Make friends
  - No friend is needed, but they will be your treasures
- Ask questions, in-class or off-class
  - Your instructor and TAs are here to help

How to know if you are doing well

- Think about the lectures
  - What concepts are covered?
  - Are they simple or complicate?
  - Why are they important?
  - Why does it justify to have such a course, such a discipline, such a research area, such a major?
    - Networking, mobile computing, software engineering, artificial intelligence, machine learning ....
  - Do they inspire something beyond the lectures?
    - e.g., How they have to do with the