CS442 Database Management Systems

Section B

Fall 2016

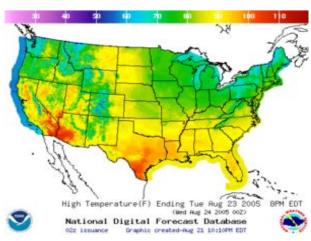
Instructor: Prof. Wendy Wang

What Is Data?

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1	Date x	Country •	Employee 💌	Customer y	Product •	Expenses •	Revenues 🕏
2	2011-04-03	USA	Richard Jones	Exxon	AAZ	\$743,59	59 664,42
3	2011-05-07	MEX	Mary Twain	Microsoft	VC8	59 208,78	\$1,531,58
4	2011-03-05	CAN	Ben Smith	Google	EWD	\$2,698,83	\$8 368,69
5	2011-07-07	BRA .	Kenneth Bush	Oracle	VBG.	\$6 985,14	\$4,793,02
6	2011-02-03	CHN	Richard Jones	PepsiCo	CVT	\$380,58	\$6,048,55
7	2011-06-30	USA	Richard Jones	Exxon	WED	\$6 106,66	\$411,79
8	2011-04-03	USA	Ben Smith	Microsoft	NHG	\$892,89	\$4,502,63
9	2011-04-03	USA	Mary Twain	Google	VBT	\$4387,13	52,456,84
10	2011-02-05	CAN	Richard Jones	Google	CVE	\$4 773,12	\$6,005,01
ij	2011-02-06	CAN	Ben Smith	Microsoft	UK	\$8 435,06	\$2,711,09
12	2011-04-03	BRA	Ben Smith	Exxon	IUR .	\$3 726,63	\$5,891,02
13	2011-02-03	8RA	Mary Twain	Oracle	THY.	\$747,00	\$4,357,24
14	2011-04-16	MEX	Richard Jones	Oracle.	BVY	\$3 975,70	52.894,99
15	2011-01-01	USA	Mary Twain	PepsiCo	NBU	54 487,14	55 336,22
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What Is a Database?





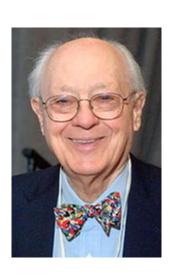
What Is a Database Management System (DBMS)?





The Origin of DBMS

• First DBMS in history: Integrated Data Stores (IDS) by Charles Bachmen, 1960.



Database Systems: Then



- IBM 7070: the first data processing system
- Built in 1960
- The machine is of 27 KIPS
- Price: \$813,000 (in 1960!).

Database Systems: Today



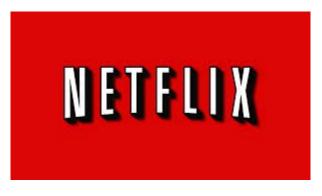


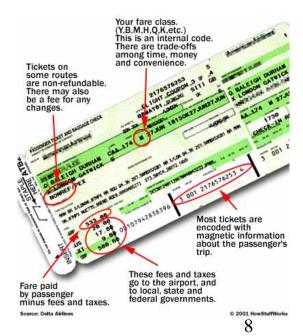
Databases you may use











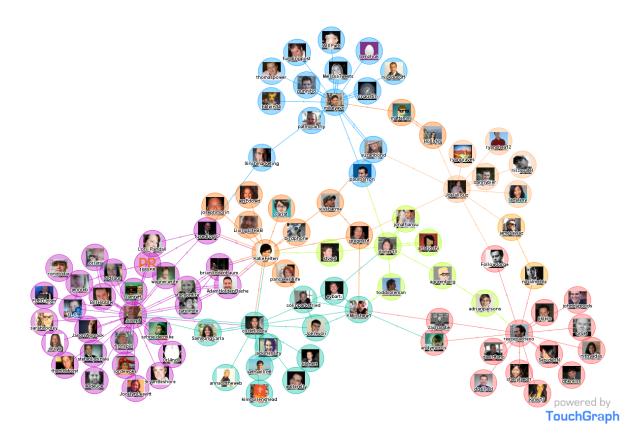
Databases you may use...without awareness (1/3)

Example 1: DB in your pocket



Databases you may use...without awareness (2/3)

Example 2: DB of social networks



Databases you may use...without awareness (3/3)

Example 3: Multimedia DB



Databases everywhere!

Because of the versatility of databases, we find them powering all sorts of projects:

- A web course registration site;
- A client tracking application for social service organisations;
- A medical record system for a health care facility;
- Your personal address book in your e-mail client;

• ...

How much data?

- Google processes 20 PB a day (2008)
- Facebook has 2.5 PB of user data + 15 TB/day (4/2009)
- eBay has 6.5 PB of user data + 50 TB/day (5/2009)



640K ought to be enough for anybody.

What's Now?

BIG DATA!!!



Do databases always make life better?

(Source: BBC News Online, July 1, 2003.)

- "Players could finally sign up for the Star Wars Galaxies game last week as Sony opened up registration to the public."
- "Once players got in to the game they found that the game servers were offline because of database problems."



 "Some players spent hours tuning their in-game characters only to find that crashes deleted all their hard work."

- Consider Facebook!
- What are its database needs?



- Consider Facebook!
- What are its database needs?
 - Store data
 - Manipulate and present data
 - Users' personal information
 - Friendship
 - Activities
 - Messages
 - Advertisements (\$\$\$)
 - Security and privacy
 - ...
- NOT an easy job!



Suppose you are building a system to store the information pertaining to the Stevens Institute of Technology.

You'll need to figure out:

Suppose you are building a system to store the information pertaining to the Stevens Institute of Technology.

You'll need to figure out:

- How do we store the data? (file organization, etc.)
- How do we query the data? (write programs...)
- Make sure that updates don't mess things up?
- Provide different views on the data? (registrar versus students)
- How do we deal with crashes?

What We Will Learn in CS442?

Roughly speaking:

- 1. How to conceptually model the concepts in a database (DB)?
- 2. How to logically model concepts in a database?
- 3. How to make the DB design efficient?
- 4. How to write DB queries?
- 5. How to create DB applications?

And enjoy!

The primary goal of this course:

- To learn how to manage data using a (relational) database management system
- To help your learning, we'll provide:
 - Lectures (of course!)
 - In-class tutorials: examples, exercises
 - In-class programming lab

Who will help you?

- Instructor: Prof. Wendy Wang (Hui.Wang@stevens.edu)
- <u>Teaching Assistant (TA)</u>: Changjiang Cai (ccai1@stevens.edu)
- Course assistants (CAs):
 - Jeff Mariconda (jmaricon@stevens.edu)
 - Steve Nunes (snunes@stevens.edu)
 - Mark Mirtchouk (mmirtcho@stevens.edu)







Changjiang Cai

Jeff Mariconda

Steve Nunes

Mark Mirtchou³²

Office Hour

Instructor Office Hour: 3pm-4pm, Mondays, Babbio 620

TA Office Hour: 2:30-3:30pm, Mondays, Lieb 223 (2nd floor of Lieb, 1st room on left)

Course Prerequisites

Required: CS 385 Data Structures and Algorithms II

Course Materials

- Required:
 - Database Management Systems, 3rd Edition, Raghu Ramakrishnan and Johannes Gehrke, McGraw-Hill, 2002.
 - What if you have already bought the 2nd edition?
 - Don't despair! You can make do with it.

Lectures & Notes

- Lectures may not follow text closely
- You are responsible for the textbook, lectures, and any additional reading that may be assigned
- Lecture notes will be available <u>before class</u> at Canvas

In-class Note Time

 Some slides in class have an icon at the top corner.



This means that you need to take notes.

Where to get more information

Canvas

- lecture notes, assignments, solutions, sample midterm & final
- Discussion board

Course Workload

- Attendance (5%)
- In-class quizzes (5%)
- In-class lab (5%)
- 4 homework assignments (40%)
- Midterm exam (20%)
- Final exam (25%)

Attendance

- In-class sign-in attendance sheet
- Each student can be absent for up to THREE lectures

Assignments

- Assignment hand-in policy
 - Submit via Canvas
- Late policy: 10 points will be taken off each day after the due date

Class Policies (I)



Electronic devices and laptops

- The use of cell phones, PDAs, IPads, etc. in class is not allowed. Devices must be turned off during class.
- Laptops may be used in class only if explicitly authorized by the instructor (e.g., for note taking).

Class Policies (II)

Make-up exam

- A make-up for pop-up quizzes will be granted only if
 - there is serious illness (proven by doctor's notes) or similarly important reason for missing the exam.
- A make-up for midterm/final will be granted only if
 - the instructor is notified BEFORE the exam; and
 - there is serious illness (proven by doctor's notes) or similarly important reason for missing the exam.

Extra credit

For fairness to all students there will be NO individual extra credit work.

Policies on Cheating

It is cheating to

- copy a solution/material from another student or some other resource without specifying it, or
- to give away a solution/material.

Zero Tolerance

 Any case of cheating will be reported to the honor board of Stevens.

Grade Complaints

 Any complaint regarding a grade must be presented no later than 7 weekdays following the pronunciation of grades of respective assignments and midterm.

Finally, what about you?

 Please fill out the survey and turn it in before you leave.