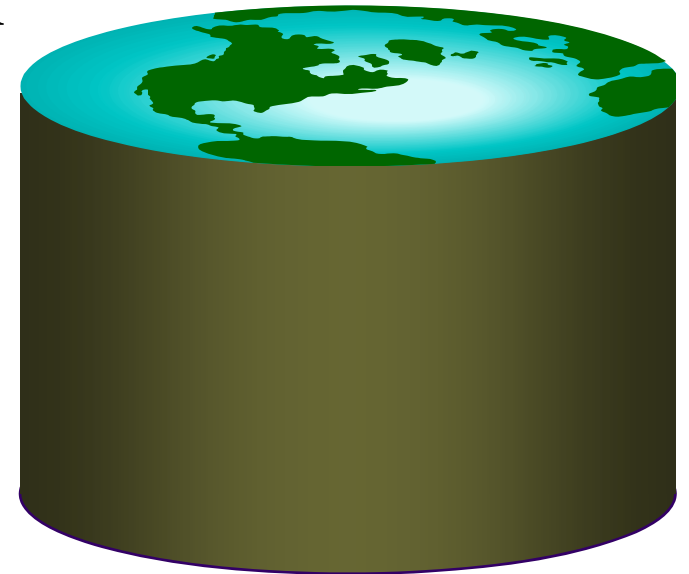


CS 405G: Introduction to Database Systems

Lecture 1: Introduction



Topics for Today

- Topics
 - Introduction
 - What is a database?
 - What is a database management system?
 - Why take a database course?
 - How to take the class?

Who am I?

- Instructor
 - Jinze Liu
 - Associate professor in the department of Computer Science at UK
 - Research area: Data mining and Bioinformatics
 - Office: 235 Hardymon building
 - [Email: liuj@cs.uky.edu](mailto:liuj@cs.uky.edu)

About the course: Information

- Class web page is at
 - http://protocols.netlab.uky.edu/~liuj/teaching/CS405G_F13/
 - Syllabus, homework, grading policy, etc. available from class web page
- Textbook
 - Fundamentals of database systems (sixth edition)
 - Ramez Elmasri and Shamkant B. Navathe
 - Can get it from the bookstore
- My Office Hours:
 - 235 Hardyman building, Wednesday 10AM-12PM
 - Email: please include CS405G in the subject line for fast response
- Class mailing list
 - Will send emails to everyone once set up.
 - Will be used for announcement/clarification of assignments/answering questions

About the Course – Workload

- 6 homework assignments
 - Including programming assignment
 - Building blocks for your project
- 4 quizzes
- 1 Programming project
- Exams
 - 1 Midterm & 1 Final
- Cheating policy: zero tolerance

About the course: Grading

- Weights
 - 6 Homework assignments 25%
 - Project 20%
 - Midterm exam 25%
 - Final exam 25%
 - Quizzes 5%
- More information is in the syllabus
 - Final grade
 - Late homework
 - Will be penalized
 - Academic mis-conduct
 - You are expected to do the assignment independently
 - Discussions if allowed should be acknowledged

About the course: Project

- Programming projects have a practical, hands-on focus:
 - A relational DBMS for a particular application
 - Projects are to be done in teams of 2
 - Pick your partner ASAP!

Database Systems?

- Name a few!

Database Systems: Bank Systems

The screenshot displays the Bank of America online banking interface. At the top, the Bank of America logo and "Higher Standards" tagline are visible. Below this is a navigation bar with tabs for "Accounts", "Bill Pay & e-Bills", "Transfer Funds", and "Customer Service". Under the "Accounts" tab, there are sub-tabs for "Accounts Overview", "Account Activity", "Account Summary", and "Search". The main heading is "John Jones - Personal Accounts" with the date "Monday, January 12, 2004".

On the left side, there is a section titled "I want to..." with the following links:

- [View my account details](#)
- [Set up a bill payment](#)
- [Pay a bill](#)
- [Transfer funds between accounts](#)

Below this is an "Announcements" section.

On the right side, there is a section titled "Account" with a list of accounts:

- [Interest Checking - 3858](#)
- [Regular Savings - 0490](#)
- [Fixed Term CD - 2747](#)
- [Fixed Term IRA - 4128](#)

Database Systems - Ecommerce

The screenshot shows the Amazon.com homepage with a search bar containing 'database systems'. The search results are displayed under the heading '"database systems"'. On the left, there is a 'Narrow by Category' section with a list of categories and their item counts. The 'Books' category is circled in red. On the right, there are two search results. The first result is 'Database Systems: Design, Implementation, and Management, Seventh Edition' by Peter Rob and Carlos Coronel, published in January 2006. The second result is 'Database Systems: A Practical Approach to Design, Implementation and Management (4th Edition) (International Computer Science Series)' by Thomas M. Connolly and Carolyn E. Beaulieu.

amazon.com

Gift Certificates | International | New Releases | Top Sellers | Today's Deals | Sell Your Stuff

Search Amazon.com database systems GO Find Gifts Web Search

"database systems"

Narrow Your Results Showing All Results

Narrow by Category

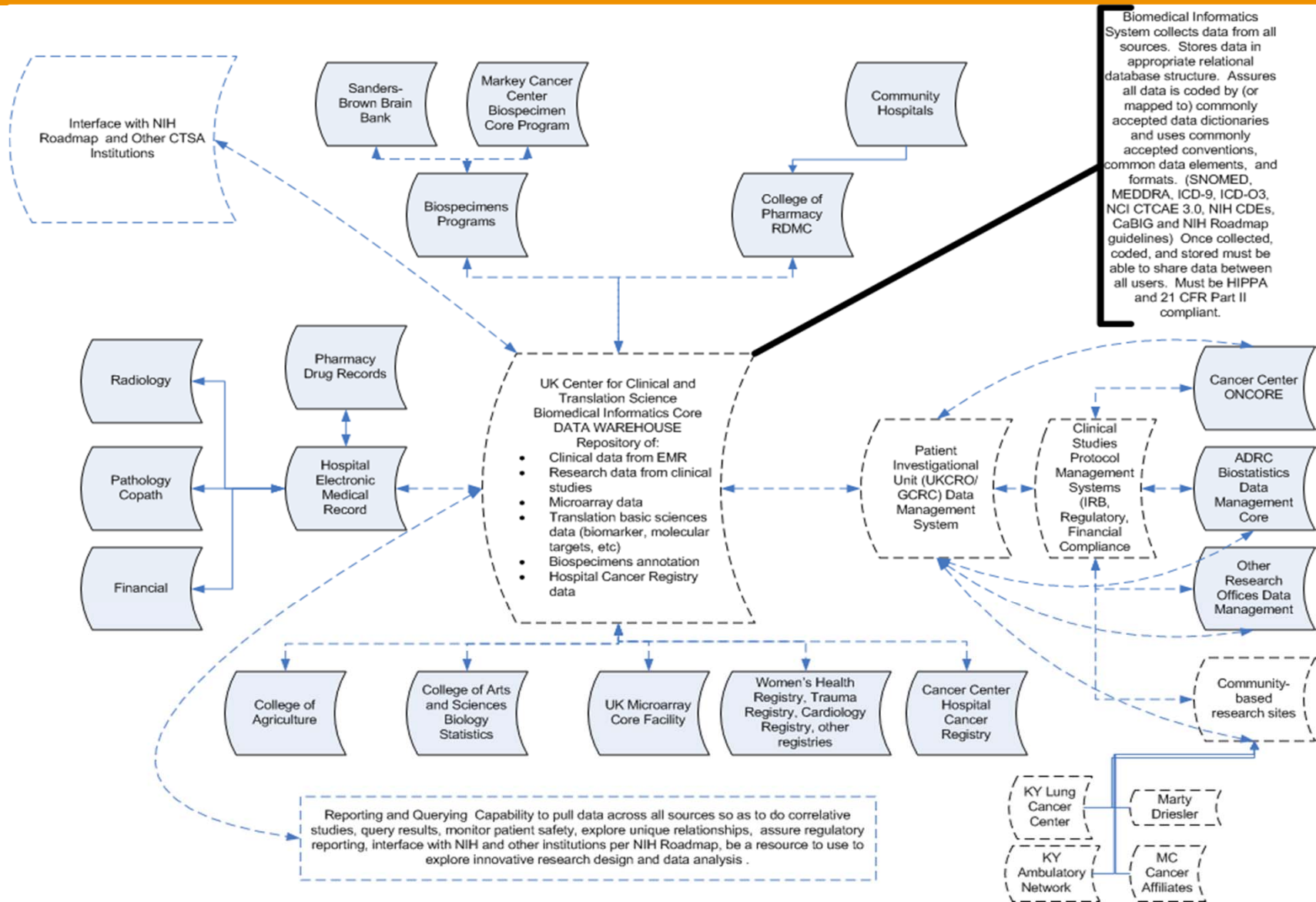
- Books (17664)
- Software (323)
- Electronics (197)
- Computers & Add-Ons (98)
- Camera & Photo (9)
- Tools & Hardware (5)
- Sports & Outdoors (2)
- Magazine Subscriptions (2)
- Musical Instruments (1)
- Kitchen & Housewares (1)
- Home & Garden (1)
- Health & Personal Care (1)

Related Searches: database, fundamentals of database systems, software engineering.

1.  **Database Systems: Design, Implementation, and Management, Seventh Edition** by Peter Rob and Carlos Coronel
(Hardcover - Jan 27, 2006)
Books: See all 17664 items
Buy new: ~~\$117.95~~ **\$99.08** **Used & new** from **\$84.00**
Get it by **January 23, 2007**, if you order in the next **5 hours and 22 minutes**.

2.  **Database Systems: A Practical Approach to Design, Implementation and Management (4th Edition) (International Computer Science Series)** by Thomas M. Connolly and Carolyn E. Beaulieu

Database Systems: Clinical Databases



Database Systems: Genome Bank

The screenshot displays the NCBI Entrez Genomes interface. At the top, the NCBI logo is on the left, and a decorative banner with DNA sequence and chromosome icons is on the right. Below the banner is a navigation bar with links: PubMed, Nucleotide, Protein, Genome, Gene, Structure, PopSet, Taxonomy, and Help. A search bar is present with the text "Search for" and a dropdown menu set to "on chromosome(s)". Other search options include "assembly", "All", "Find", and "Advanced Search". A checkbox for "Show related entries" is also visible. Below the search bar are links for "Help", "FTP", and "Map Viewer home".

The main content area is titled "Entrez Genomes" and "MapViewer Home". It features a link to "Homo_sapiens genome view" and a link to "BLAST search the human genome". Below this is a section for "Map Viewer" with links for "Help", "Human Maps Help", "Mouse Maps Help", and "NCBI Handbook".

The "Related Resources" section includes links to "Human Genome Guide", "Genomic Biology", "Gene", "OMIM", and "UniGene". The "Sequence Data" section includes links to "Human Genome", "Sequencing", "Mouse Genome", "Sequencing", and "RefSeq".

The central part of the page shows a karyotype of the human genome, with chromosomes arranged in pairs and labeled 1 through 22, X, and Y. Below the karyotype is a lineage tree showing the taxonomic classification of Homo sapiens: Eukaryota, Metazoa, Chordata, Craniata, Vertebrata, Euteleostomi, Mammalia, Eutheria, Euarchontoglires, Primates, Catarrhini, Hominidae, Homo, and Homo sapiens.

What is a Database?

- A *database* is an integrated collection of data.
 - Data is a group of facts that can be recorded.
- Typically a database is used to model a real-world “enterprise” (or a *miniworld*)
 - **Entities** (e.g., *basketball teams, games*)
 - **Relationships** (e.g. *UK’s basketball team beat ? yesterday*)

What is a Database Management System?

- A **Database Management System (DBMS)** is a collection of programs that enable users to create and maintain databases
 - store, manage, and access data in a databases.
- Typically this term is used narrowly
 - Relational databases with transactions
 - E.g. Oracle, DB2, SQL Server
 - Mostly because they predate other large repositories
 - Also because of technical richness
 - When we say **DBMS** in this class we will usually follow this convention
 - But keep an open mind about applying the ideas!

Why take this class?

- A. Database systems are at the core of CS
- B. They are incredibly important to society
- C. The topic is intellectually rich
- ~~D. It isn't that much work~~
- E. Looks good on your resume

Let's spend a little time on each of these

Why take this class?

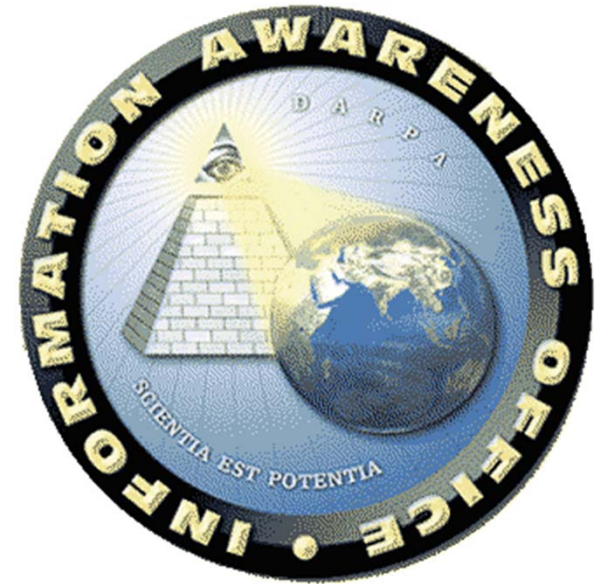
A. Database systems are the core of CS

- Shift from computation to information
 - True in corporate computing for years
 - Web made this clear for personal computing
 - Increasingly true of scientific computing
- Need for DB technology has exploded in the last few decades
 - **Corporate**: retail swipe/clickstreams, “customer relationship mgmt”, “supply chain mgmt”, “data warehouses”, etc.
 - **Web**: not just “documents”. Search engines, e-commerce, blogs, wikis, other “web services”.
 - **Scientific**: digital libraries, genomics, satellite imagery, physical sensors, simulation data
 - **Personal**: Music, photo, & video libraries. Email archives. File contents (“desktop search”).

Why take this class?

B. DBs are incredibly important to society

- “Knowledge is power.” -- Sir Francis Bacon
- “With great power comes great responsibility.” -- SpiderMan’s Uncle Ben



Policy-makers should understand technological possibilities.
Informed Technologists needed in public discourse on usage.

Why take this class?

C. The topic is intellectually rich.

- representing information
 - data modeling
- languages and systems for querying data
 - complex queries & query semantics*
 - over massive data sets
- concurrency control for data manipulation
 - controlling concurrent access
 - ensuring transactional semantics
- reliable data storage
 - maintain data semantics even if you pull the plug
- data mining
 - Let your data speak

* semantics: the meaning or relationship of meanings of a sign or set of signs

Why take this class?

~~D. It isn't that much work.~~

- Bad news: It is a lot of work.
- Good news: the course is front loaded
 - Most of the hard work is in the first half of the semester
 - Load balanced with most other classes

Why take this class?

E. Looks good on my resume.

- Yes, but why? This is not a course for:
 - Oracle administrators
 - IBM DB2 engine developers
 - Though it's useful for both!
- It is a course for well-educated computer scientists
 - Database system concepts and techniques increasingly used “outside the box”
 - Ask your friends at Microsoft, Yahoo!, Google, Apple, etc.
 - Actually, they may or may not realize it!
 - A rich understanding of these issues is a basic and (un?)fortunately unusual skill.