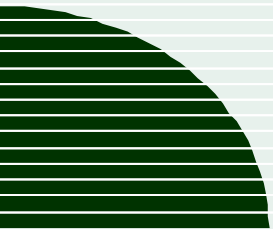


# Tecnologie e Sistemi per la Gestione di Basi di Dati e Big Data M

Proff. Marco Patella, Paolo Ciaccia



# Course objectives

- Knowledge of realization principles of DataBase Management Systems
- DB physical design
- Basically two points of view:
  - Data storage and indexing (M. Patella)
  - Query processing (P. Ciaccia)

# Course program

- Architecture of a DBMS
- Physical structure of a DBMS
- Indexing
- Transaction management
- Query processing
- Physical design
- Multi-dimensional data
- Top-k and Skyline queries
- Big data and NoSQL systems

# Class schedule

- Wednesday 11-14 room III (C.I.)
- Thursday 12-14 room 1.4

# Prerequisites

- For students coming from Comp.Eng. (BO):
  - Sistemi Informativi T
  - (Progettazione di Applicazioni Web T)
- For other students:
  - Any course on DBs (relational model/SQL)

# Basic concepts

- What is a DBMS?
- What is a relational DBMS?
- How can I access a relational DBMS?
- What are the issues when accessing a relational DBMS?
- (How do I design a relational DB?)

# The “Information Systems” path

- Is there something outside “traditional” information systems?
- Is there something outside relational DBMS?
- The answer is “YES!”:
  - Data Mining M
    - Other data types
    - Data analytics
  - Multimedia Data Management M
    - Other data types
    - Other query types

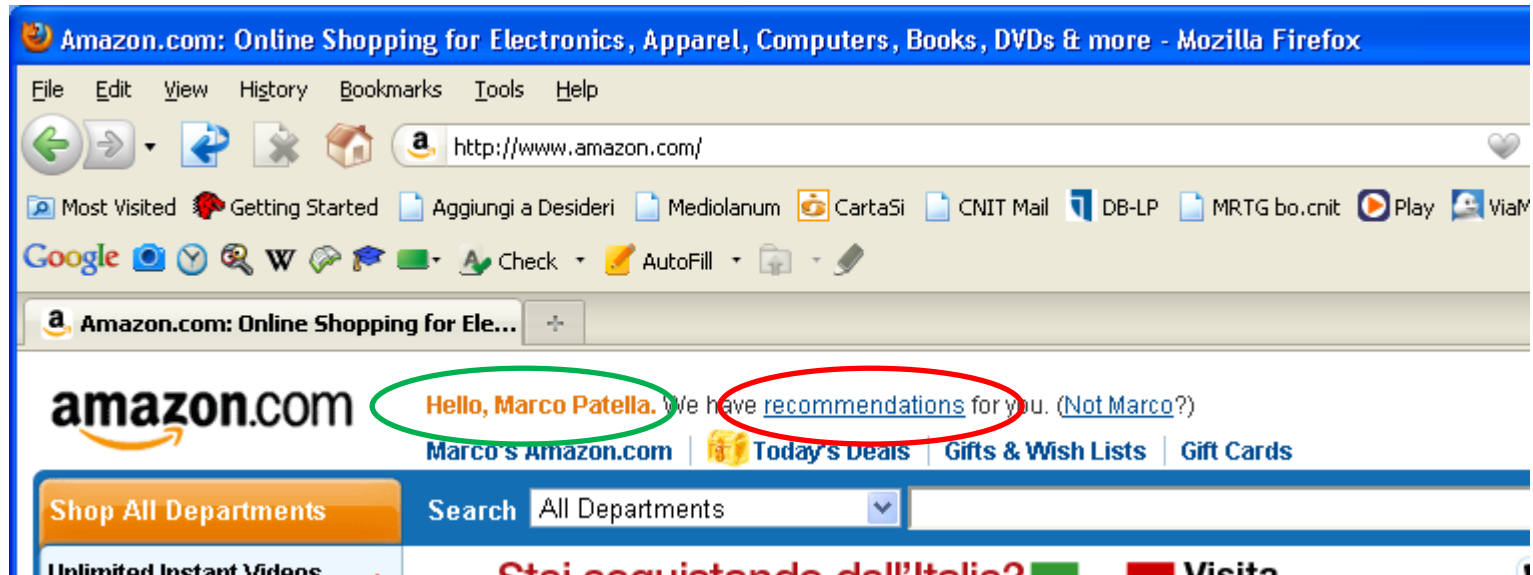
# “Data” management

- The common thread that links courses is the efficient management of large amounts of data
- Unfortunately (?), not all problems are solvable using a relational DB



# Example 1: recommendations

- Recommending new products



- DB of products and clients
- How do I integrate them?
- New queries...

# Example 2: search engines

- How do they work?
  - New data types and queries

The screenshot shows a Mozilla Firefox browser window with the title "database management systems - Google Search - Mozilla Firefox". The address bar contains the URL "http://www.google.com/search?hl=en&rlz=1B3GGGL\_enIT286IT286&q=database+management+systems". The search bar contains the text "database management systems". The search results page shows the Google logo, the search query "database management systems", and the number of results "About 15,000,000 results (0.28 seconds)". The search results include an advertisement for "Free Database Software - Build your own DatabaseApp easily." and two organic search results: "Database management system - Wikipedia, the free encyclopedia" and "Database Management Systems (Third Edition)".

database management systems - Google Search - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.google.com/search?hl=en&rlz=1B3GGGL\_enIT286IT286&q=database+management+systems database management systems

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Web Images Videos Maps News Shopping Mail more Marco Patella

Google database management systems Search

About 15,000,000 results (0.28 seconds) Advanced search

Everything

- Images
- Videos
- News
- Shopping
- Books
- More

Any time

- Latest
- Past 24 hours

Free Database Software - Build your own DatabaseApp easily. Ad

Just Drag-and-Drop!  
zoho.com/creator/database-software

Database management system - Wikipedia, the free encyclopedia ☆ 🔍

A Database Management System (DBMS) is a set of computer programs that controls the creation, maintenance, and the use of a database. ...

Overview - History - 1960s Navigational DBMS - Building blocks  
en.wikipedia.org/wiki/Database\_management\_system - Cached - Similar

Database Management Systems (Third Edition) ☆ 🔍

Database Management Systems has quickly become one of the leading texts for database courses, known for its practical emphasis and comprehensive coverage. ...

pages.cs.wisc.edu/~dbbook/ - Cached - Similar

# Example 3: advanced search engines

- How do they work?
  - New data types and queries

The screenshot shows a Mozilla Firefox browser window displaying a Google Images search for "bologna towers". The search results page includes a sidebar with navigation options like "Everything", "Images", "Videos", "News", "Shopping", and "More". The main content area shows a grid of image thumbnails. One thumbnail is selected and enlarged, showing a detailed view of the Bologna Leaning Towers. The caption for this image reads: "1 Bologna Leaning Tower 375 x 525 - Bologna, Leaning Towers. travel-tidbits.com Similar More sizes". A red circle highlights the "Similar" link in the caption. The browser's address bar shows the search URL, and the search bar contains the text "bologna towers".

# Example 4: social networks

## ■ Sharing personal data among users

The image is a collage illustrating social networks and data sharing. It features several screenshots and logos:

- Flickr Search:** A screenshot of a Flickr search page for the term "beach". It shows a grid of image thumbnails with captions like "From CubaGallery", "From nobleup", and "From anaisacrobot".
- YouTube Search:** A screenshot of a YouTube search page for "back in black". It displays search results for the song, including videos from Amy Winehouse, AC/DC, and Iron Man 2. The top result is "Amy Winehouse - Back To Black (Official Video)" with 301,531 views.
- Facebook:** A large blue logo for Facebook is positioned in the upper right.
- Twitter:** A blue bird logo for Twitter is positioned in the lower right.

# Assessment Methods

- Oral exam
  - Both “POVs” are investigated
  - Score obtained as the average on the two exams
- No specific (pre-determined) exam sessions
  - The exam date is agreed with the teachers
  - Possibly, students will be grouped into sessions

# Teaching materials

- All slides are available on the course page  
<http://www-db.disi.unibo.it/courses/TBD/>
- Other available resources:
  - Communications
  - Warnings...

# Other suggested textbooks

- P. Ciaccia, D. Maio: Lezioni di Basi di Dati, Esculapio, 2001
- A. Albano: Costruire Sistemi per Basi di Dati, Addison-Wesley, 2001
- R. Ramakrishnan, J. Gehrke: Database Management Systems, McGraw-Hill, 2007
- P. Lewis, A. Bernstein, M. Kifer: Databases and Transaction Processing, Addison-Wesley, 2002
- D.E. Shasha, P. Bonnet: Database Tuning, Morgan Kaufmann, 2003

# Contacts

- Teacher: **Marco Patella**
- Office hours:
  - **Thursday, 15-17**  
c/o DISI building
- Address:
  - Tel.: 051 – 2093800
  - e-mail: [marco.patella@unibo.it](mailto:marco.patella@unibo.it)
  - Internet: <http://www-db.disi.unibo.it/~mpatella>



# Contacts

- Teacher: **Paolo Ciaccia**
- Office hours:
  - **Thursday, 14:30-16**  
c/o DISI building
- Address:
  - Tel.: 051 – 2093070
  - e-mail: [paolo.ciaccia@unibo.it](mailto:paolo.ciaccia@unibo.it)
  - Internet: <http://www-db.disi.unibo.it/~pciaccia>