

The Lay View · "A database is any collection of information" • Might be a simple file • Might not even be on a computer! • Far too broad, but it's hard to fight everyday usage

An extreme operational definition

- "A database is a structured collection of information created, managed, and accessed using one of a number of software packages commonly accepted as Database Management Systems."
- Too limited, but on the right track.
- "structured" and "using a DBMS" are fairly essential

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Common Characteristics

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These are not found in every DB, but most are found in most DBs

• Large size

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- Multiple files
- · Well-structured data
- not free-form text, not large binary blobs
- · Many instances of a few structures · A snapshot of the real world
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More Characteristics

- · Many users
 - both end-users and programmers
 - not viewed directly by end-users
- · Under administrative control - separate from end-users and programmers
- "Data processing" rather than "computer science" applications
- Characteristic applications are large, longlived, and critical to the organization 10/5/97

The Database Management System (DBMS)

- Definition: Software components for creating, administering, and managing access to the database.
- "Below" the DBMS: file system, operating system, networking, hardware
- "Above" the DBMS: DB administrator, application programs.
- "Above" the application programs: endusers.

PCs vs Mainframes

- PCs: The same person may act as administrator, programmer, end-user, etc.
- Mainframes (or big applications generally): - normally a sharp division of human roles
 - DB and the DBMS may be part of an even more complex software/hardware arrangement
 - multiple computers, multiple platforms, client/server, networks, tie-ins to other software systems...

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Some Classic DB Topics

- Data modeling
 - Look at the real world and the application, identify pieces of data needed and their relationships
 - We will study "E/R modeling"
- Database design

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- Turning the model into a structure supported by the DBMS
- We will focus on the "relational" model

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Classic Topics (continued)

- · Query Languages
 - Languages designed to support "queries" (requests for data) and other DB operations
 - We will study the formal "relational algebra" and the practical language SQL.
- Transaction processing
 - Managing user-activated programs, to guarantee service and preserve DB integrity.
 - We will learn the key issues and terminology.

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Classic topics (concluded)

- File storage and structures
 - How data is organized on disk for efficient access.
 - In particular we will learn about a data structure called a "B-tree."
- Query processing (time permitting) – How complex queries can be internally
 - How complex queries can be interna reorganized for efficiency

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At Least One Modern Topic

- · Object-oriented DB
 - Complex data types (sound, images, timeseries, etc.)
 - "Persistent" objects
 - Integration with OO languages like C++, Java
 - Theory and practice are both in flux

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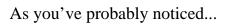
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Database Soup

4GL RAD RAID R/3 Datamart ODMS CORBA COM JDC SAP MDM OLAP...

- *What's going on out there?!* Schedule permitting, we'll use a little class time to sort through some current commercial developments.
- Your papers could also stir through the soup
- Your projects might use some of that stuff ...

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- DB has links with many other areas of Computer Science:
 - Operating Systems
 - Software Engineering
 - Computer Architecture
 - Programming Languages
 - etc., etc.

Try to spot the connections!

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