

Database Management Systems

Introduction

Major application focuses of computers

- computing (which is not considered in this course)
- Storing data (creating new data)
- Retrieving data (viewing existing data)
- Manipulating data (processing/updating existing data)

How we usually deal with data

- directly in programs
 - limited memory
 - data loss when program terminates (voluntarily or involuntarily)
- use files
 - lots of limitations
- use databases
 - our perfect solution for data-related problems

Limitation of using files and file systems

- data format depends on the individual programs (or programmers)
- lack of concurrency (only one person can update a file at any given time)
- one application program for each question asked by the users
- hard to be enforced data integrity
- redundant storage, independent copies leads to inconsistent copies, expensive updates
- added complexity of data recovery
- security problems

What is a database?

- A computerized record-keeping system
- A collection of persistent data used by applications
- A (large and persistent) collection of (more-or-less similar) data organized in a way that facilitates efficient retrieval and modification.

Common features of databases

- data is formatted
- data is important (must store data reliably (crash recovery) and securely)
- large amounts of data (must store data in mass (secondary) storage and retrieve/manipulate data efficiently)
- simultaneous access to data by multiple users and applications (must have concurrency control)
- simultaneous access to data by multiple users and applications (must have independent data format)

What is Database Management System?

- A software program
- it is designed to assist in maintaining and manipulating the large collections of data
- Objective: to isolate application programs as much as possible from changes to data and to descriptions of data

Basic Ideas used by DBMS

- remove details related to data storage and access from application programs
- concentrate those functions in a single sub-system: DBMS
- have all applications access data through the DBMS

What has been achieved using DBMS?

- Data can be shared easily
- Redundancy can be reduced
- Inconsistency can be avoided
- Transaction can be provided
- Integrity can be maintained
- Security can be enforced
- Backup and recovery can be done
- Conflicting requirements can be balanced
- Reduced application development time

Applications of Database Technology

- inventory control
- payroll
- digital library systems
- reservation systems
- banking records
- hospital, university, government,
- etc.

More Applications

- Web search
- scientific and medical databases
- integrating information
- data mining
- back end of almost every on-line businesses: Amazon, Google, etc.
- etc.