Lecture 2

Database Systems

Instructor: M.Imran Khalil

Imrankhalil3@gmail.com

Resource:Imrankhalil3.wordpress.com

A little review of previous lecture

▶ Course Outline of this course

▶ Introduction to Database

    ▶ Database & DBMS

▶ File based approach

▶ Draw backs to File based approach
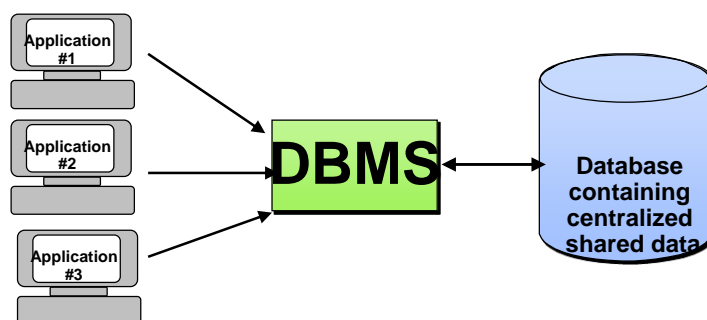
    ▶ Data redundancy and inconsistency

    ▶ Difficulty of accessing data

Todays lecture

▶ Benefits of Database
▶ Components of databases
▶ Some recent trends in database
▶ Categories of database

Database Management System

DBMS manages data resources like an operating system manages hardware resources

Advantages of Database Approach

➤ Program-Data Independence
- Metadata stored in DBMS, so applications don't need to worry about data formats
  - Data queries/updates managed by DBMS so programs don't need to process data access routines
- Results in: increased application development and maintenance productivity

➤ Minimal Data Redundancy
- Leads to increased data integrity/consistency

©University of Sargodha Canal Campus Lahore

Advantages of Database Approach

- Improved Data Sharing
  - Different users get different views of the data
- Enforcement of Standards
  - All data access is done in the same way
- Improved Data Quality
  - Constraints, data validation rules
- Better Data Accessibility/ Responsiveness
  - Use of standard data query language (SQL)
- Security, Backup/Recovery, Concurrency
  - Disaster recovery is easier

©University of Sargodha Canal Campus Lahore

Costs and Risks of the Database Approach

- Up-front costs:
  - Installation Management Cost and Complexity
  - Conversion Costs
- Ongoing Costs
  - Requires New, Specialized Personnel
  - Need for Explicit Backup and Recovery
- Organizational Conflict
  - Old habits die hard
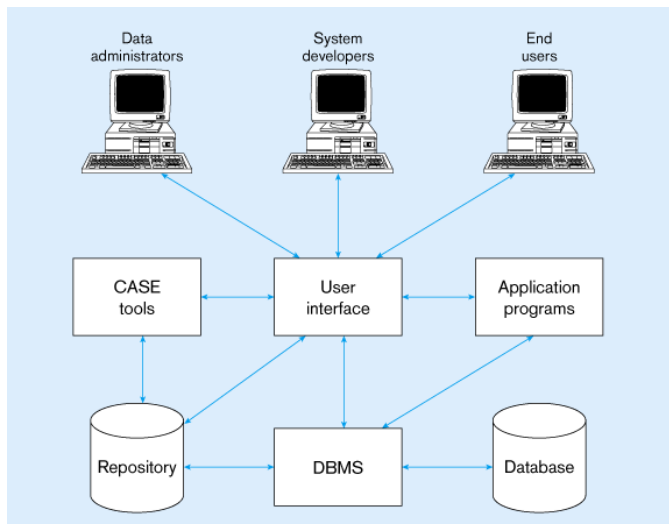
Figure 1-10 Components of the database environment

Components of the Database Environment

- CASE Tools – computer-aided software engineering
- Repository – centralized storehouse of metadata
- Database Management System (DBMS) – software for managing the database
- Database – storehouse of the data
- Application Programs – software using the data
- User Interface – text and graphical displays to users
- Data Administrators – personnel responsible for maintaining the database
- System Developers – personnel responsible for designing databases and software
- End Users – people who use the applications and databases

What do you want from a DBMS?

- Answer queries (questions) about data
- Update data
- And keep data around (Persistent)
- Example: A traditional banking application
- Each account belongs to a branch, has a number, an owner, a balance,……
- Query: What's the balance in Ali Traders account?
- Modification: Ali traders withdraws 1000 Rs.
- Persistency: Ali will be pretty upset if his balance disappears after power outage

Some Recent Trends

- **DBMS are getting smaller and smaller**
  - ▶ DBMS that can store GB of data can run on PC
- **Databases are getting bigger and bigger**
  - ▶ Multiple TBs (terabyte = 1012 bytes) not uncommon
  - ▶ Databases also able to store images, video, audio
  - ▶ Database stored on secondary storage devices
- **DBMS Supporting Parallel Computing**
  - ▶ Speed-up query processing through parallelism (e.g., read data from many disks)
  - ▶ However, need special algorithms to partition data correctly

When NOT to Use a DBMS

- ▶ Initial investment too high
- ▶ Too much overhead
- ▶ Application is simple, well-defined, not expected to change
- ▶ Multi-user access to data is not required

End of lecture

©University of Sargodha Canal Campus Lahore