UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA

Course Name : Database Management System

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Module 1: Introduction of DBMS

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Outline

- Basic concepts
- The Need for Databases
- Data Models
- Relational Databases
- Database Design
- Storage Manager
- Query Processing
- Transaction Manager

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- Data : Raw & Isolated facts about an entity or any real life thing.
- Information : Processed, meaningful and useable form of data.
- Database : Collection of similar / related data.
- DBMS : A set of programs / software used to create, manipulate and delete database / database items.

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Database Management System (DBMS)

- DBMS contains information about a particular enterprise
  - Collection **of interrelated data**
  - **Set of programs to access the data**
  - An **environment** that is both *convenient* and *efficient* to use

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Database Management System (DBMS)

- Database Applications: Examples:
  - Banking: transactions
  - Airlines: reservations, schedules
  - Universities: registration, grades
  - Sales: customers, products, purchases
  - Online retailers: order tracking, customized recommendations
  - Manufacturing: production, inventory, orders, supply chain
  - Human resources: employee records, salaries, tax deductions
- Databases can be very large.
- Databases touch all aspects of our lives

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Database System Applications

- Enterprise Information:
  - Sales – for customer, products &purchase history information
  - Accounting – For Payments , reciepts, acc balance etc. information
  - HR : information about employees
  - Manufacturing : supply chain, tracking orders, inventories of warehouses.
  - Online retailers: sales dta, order trackings, recommended lists etc.

Database System Applications (Contd.)

- Banking & Finance:
  - Banking : customer information, accounts, loans etc.
  - Credit card transactions : purchases on card, monthly statement generation etc.
  - Loan management : Applications, management, pipelining, approval & EMI manegement etc.

Database System Applications (Contd.)

- Airline:
  - Reservation management :
  - Scheduling :
- Telecommunication:
  - Call records management:
  - Monthly bill generation etc.

University Database Example

- **Application program examples**
  - Add new students, instructors, and courses
  - Register students for courses, and generate class rosters
  - Assign grades to students, compute grade point averages (GPA) and generate transcripts
- In the early days, database applications were built directly on top of file systems

Drawbacks of using file systems to store data

- **Data redundancy and inconsistency**
  - Multiple file formats, duplication of information in different files
- **Difficulty in accessing data**
  - Need to write a new program to carry out each new task
- **Data isolation**
  - Multiple files and formats
- **Integrity problems**
  - Integrity constraints (e.g., account balance > 0) become “buried” in program code rather than being stated explicitly
  - Hard to add new constraints or change existing ones

Drawbacks of using file systems to store data (Cont.)

- **Atomicity of updates**
  - Failures may leave database in an inconsistent state with partial updates carried out
  - Example: Transfer of funds from one account to another should either complete or not happen at all

Drawbacks of using file systems to store data (Cont.)

- **Concurrent access by multiple users**
  - Concurrent access needed for performance
  - Uncontrolled concurrent accesses can lead to inconsistencies
    - Example: Two people reading a balance (say 100) and updating it by withdrawing money (say 50 each) at the same time
- **Security problems**
  - Hard to provide user access to some, but not all, data

Database systems offer solutions to all the above problems

Thank You

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