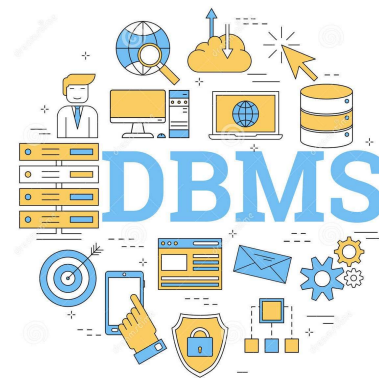


Unit I - Introduction

Purpose of Database System - Views of data - Data models, Database Management system - Three-schema architecture of DBMS, Components of DBMS. Entity -Relationship Model - Conceptual data modeling - motivation, entities, entity types, attributes, relationships, relationship types, E/R diagram notations, Examples





Introduction²

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

Database systems are used to manage collections of data that are:

Highly valuable

Relatively large

Accessed by multiple users and applications, often at the same time.

A modern database system is a complex software system whose task is to manage a large, complex collection of data.

Databases touch all aspects of our lives



Database Applications Examples

- **Enterprise Information**
 - Sales: customers, products, purchases
 - Accounting: payments, receipts, assets
 - Human Resources: Information about employees, salaries, payroll taxes.
- **Manufacturing:** management of production, inventory, orders, supply chain.
- **Banking and finance**
 - customer information, accounts, loans, and banking transactions.
 - Credit card transactions
 - Finance: sales and purchases of financial instruments (e.g., stocks and bonds; storing real-time market data
- **Universities:** registration, grades



Database Applications Examples

- Airlines: reservations, schedules
- Telecommunication: records of calls, texts, and data usage, generating monthly bills, maintaining balances on prepaid calling cards
- Web-based services
 - Online retailers: order tracking, customized recommendations
 - Online advertisements
- Document databases
- Navigation systems: For maintaining the locations of various places of interest along with the exact routes of roads, train systems, buses, etc.



Purpose of Database Systems ^{5/14}

- **Data redundancy and inconsistency:** data is stored in multiple file formats resulting in 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



Purpose of Database Systems ^{6/14}

- **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
- **Concurrent access by multiple users**
 - Concurrent access needed for performance
 - Uncontrolled concurrent accesses can lead to inconsistencies
 - Ex: 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