

Data And Applications

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Contents

1	Databases and Database Users	3
1.0.1	Introduction	3
1.0.2	Characteristics of the Database Approach	4

Chapter 1

Databases and Database Users

1.0.1 Introduction

A **database** is a collection of related data. By **data**, we mean known facts that can be recorded and have implicit meaning. This is a very general definition.

A database has the following implicit properties:

- Database represent some aspect of the real world, call its **Universe of Discourse (UoD)**.
- Database is a logically coherent collection of data with some inherent meaning.
- It has a specific purpose.

A **database management system (DBMS)** is a computerized system that enables users to create and maintain a database. The DBMS facilitates the following jobs:

- **Defining** a database involves specifying the data types, structures and constraints of the data to be stored in the database. The database definition or descriptive information is also stored by the DBMS in the form of a database catalog or dictionary; it is called **meta-data**.
- **Constructing** the database is the process of storing the data on some storage medium controlled by the DBMS.
- **Manipulating** a database includes querying, updating, generating reports.
- **Sharing** a database allows multiple users to access it simultaneously.

An **application program** accesses the database by sending queries or requests for data to DBMS.

A **query** typically causes some data to be retrieved.

Protection includes *system protection* against hardware or software malfunction and *security protection* against unauthorized or malicious access.

The DBMS must be able to **maintain** the database system by allowing the system to evolve as requirements change over time.

Together a database and DBMS software form a **database system**.

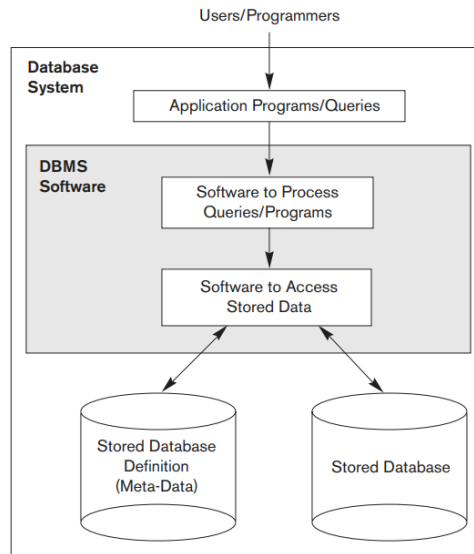


Figure 1.1: A simplified database system environment

1.0.2 Characteristics of the Database Approach

- **Self-Describing Nature of a Database System**

A database system contains a complete definition of the database structure and constraints. This definition is stored in the DBMS catalog. The information stored in the catalog is called **meta-data**, and it describes the structure of primary database. Some systems such as NOSQL systems, do not require meta-data as they store **self-describing data** that includes the data info and data in one structure.

- **Data Abstraction**