UNIT I

INTRODUCTION

Main Characteristics of the Database Approach

- A number of characteristics distinguish the database approach from the much older approach of programming with files.
- The main characteristics of the database approach versus the file-processing approach are the following:
  - Self-describing nature of a database system
  - Insulation between programs and data
  - Data Abstraction
  - Support of multiple views of the data

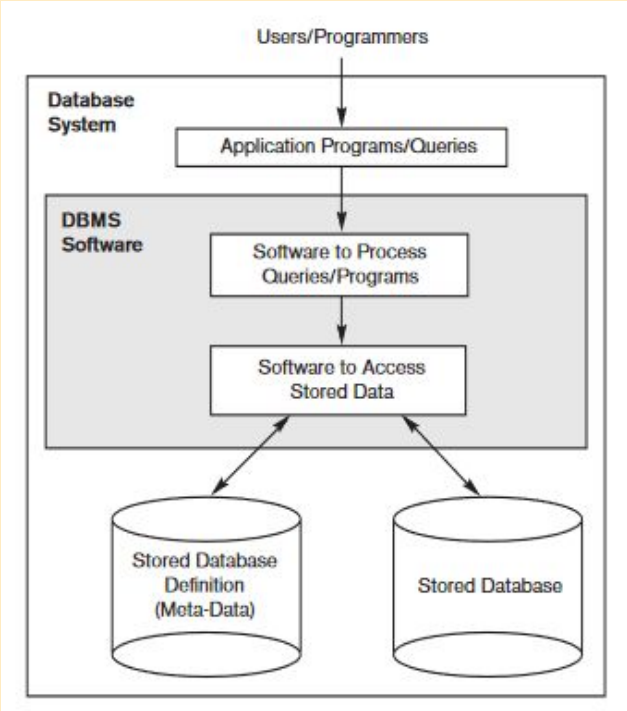
Main Characteristics of the Database Approach

- Self-describing nature of a database system: A DBMS **catalog** stores the *description* of the database. The description is called **meta-data**). This allows the DBMS software to work with different databases.
- Insulation between programs and data: Called **program-data independence**. Allows changing data storage structures and operations without having to change the DBMS access programs.
- Support of multiple views of the data: Each user may see a different view of the database, which describes *only* the data of interest to that user.
- Sharing of Data and Multiuser Transaction Processing: A **data model** is used to hide storage details and present the users with a *conceptual view* of the database.

Main Characteristics of the Database Approach

Self-describing nature of a database system:

- The database system contains not only the database itself but also a **complete definition or description of the database structure and constraints**.
- The description is called **meta-data**
- A **DBMS catalog** stores the *description* of the database.
- This allows the DBMS (general-purpose) software to work with different databases.



Main Characteristics of the Database Approach

Insulation between programs and data:

- In traditional file processing, the structure of data files is embedded in the application programs, so any changes to the structure of a file may require changing all programs that access that file.
- The structure of data files is stored in the DBMS catalog separately from the access programs.
- This property is called **program-data independence**.
  - Allows changing data storage structures and operations without having to change the DBMS access programs.

Main Characteristics of the Database Approach

Support of multiple views of the data:

- A database typically has many users, each requiring a different perspective or **view** of the database - which describes *only* the data of interest to that user.

TRANSCRIPT

Student_name	Student_transcript				
	Course_number	Grade	Semester	Year	Section_id
Smith	CS1310	C	Fall	08	119
	MATH2410	B	Fall	08	112
Brown	MATH2410	A	Fall	07	85
	CS1310	A	Fall	07	92
	CS3320	B	Spring	08	102
	CS3380	A	Fall	08	135

(a)

COURSE_PREREQUISITES

Course_name	Course_number	Prerequisites
Database	CS3380	CS3320
		MATH2410
Data Structures	CS3320	CS1310

(b)

- A multiuser DBMS whose users have a variety of distinct applications must provide facilities for defining multiple views

Main Characteristics of the Database Approach

VIEW :

- A view may be a subset of the database.
- Contain virtual data that is derived from the database files but **is not explicitly stored**. Some users may not need to be aware of whether the data they refer to is stored or derived

Main Characteristics of the Database Approach

Sharing of Data and Multiuser Transaction Processing:

- A multiuser DBMS -must allow multiple users to access the database at the same time.
- The DBMS must include **concurrency control software** to ensure that several users trying to update the same data do so in a controlled manner so that the result of the updates is correct.
- A fundamental role of multiuser DBMS software is to ensure that concurrent transactions operate correctly and efficiently.
- The concept of a transaction has become central to many database applications.
    - The DBMS must enforce several transaction properties **– ACID properties.**

Main Characteristics of the Database Approach

- A **transaction** is a single logical unit of work which accesses and possibly modifies the contents of a database.
- Transactions access data using read and write operations.
- In order to maintain consistency in a database, before and after the transaction, certain properties are followed. These are called **ACID** properties.