

Week-I

DBMS → data base management system

- DBMS contain info about a particular enterprise.
- collection of interrelated data
- set of programmes to access the data
- an environment that is both convenient & efficient to use.

→ APPL.ICATN

↳ Banking, Airline, universities
sales, social media

→ In earlier days, database application were built directly on top of file system.

DrawBack of File System:

- data Redundancy and Inconsistency.
- difficulty in accessing data
- Limited data Retrieval capabilities.
- data Isolation and Integrity issues.
- Atomicity: if a program is run it must execute completely or not at all.

Evolution of Data Management:

→ Management of data or Records is a basic need of human society.

- Storage
- Retrieval
- Transcation
- Audit
- Archival

→ For

- ↳ Individual
- ↳ ~~Physical~~ small/big enterprise
- ↳ electronic global

→ Two major approach

- ↳ Physical
- ↳ electronic

LEVEL OF ABSTRACTION:

↳ degree of complexity at which a system is viewed.

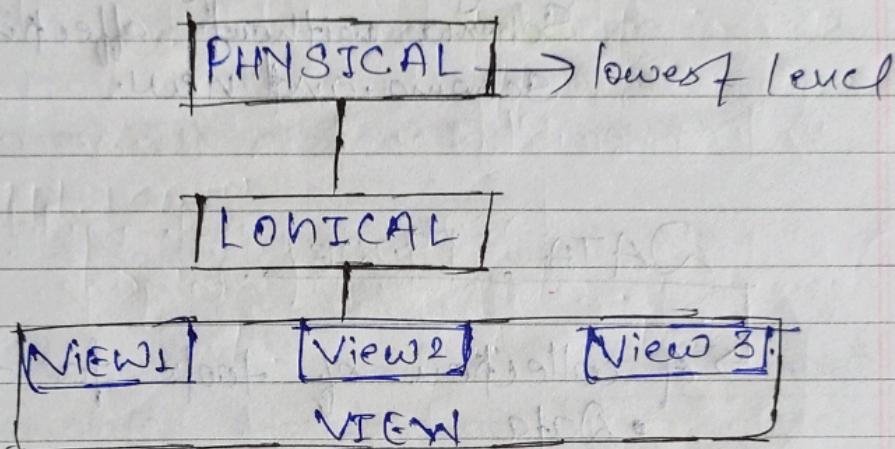
3 level of Abstraction:

↳ PHYSICAL LEVEL: describes how a record is stored as in books, online etc.

↳ LOGICAL LEVEL: the way data is viewed or accessed by end-user or applications.

→ View LEVEL: - the level at which we actually see the data.

↳ views can also hide info for security purpose.



* SCHEMAS & INSTANCES.

→ A SCHEMA is the context of database refers to the overall structure that defines how data is organised, how relationships among different data elements are defined.

Schema :- describes how data is organised in database.

→ Basically SCHEMA is heading if it is the actual content of database.

Name	ID	Mobile
------	----	--------

Name	ID	Mobile
Ashish	1234	Nhi pta

SCHEMA is of 2 types:-

- 1) PHYSICAL :- refers to the way data is physically stored on the storage device.
- Stores data internally

M 3001
PAGE NO.
DATE:
What attribute should be placed in which table of database

↳ LOGICAL: logical schema represents the structure of the entire database from a logical perspective.

→ # Note: Physical Data Independence: is the ability to modify the physical Schema without affecting logical schema and view.

DATA MODEL.

→ A collection of tools for describing.

- Data
- Data Relationship
- Data Semantics
- Data constraints

→ In this course we'll mainly focus on RELATIONAL MODEL.

↳ all the data is stored in various table

→ # Note: Logical Data Independence: a change in logical level of DBMS should not affect view level

* DDL (Data Definition Language).

→ It is subset of SQL used to define the structure and organization of database.

→ Used to define & Schema.
→ ex:

```

    → ID char(5)
    → name Ashish(20)
    → salary numeric(8,2))
  
```

- DDL compiler generates a set of table templates stored in a Data dictionary.
- Data dictionary contains metadata
 - Database Schema
 - Integrity constraints
 - Authorization (who can access what)

* DML (Data Manipulation Language)

DML: also known as QUERY LANGUAGE.

- Language for accessing and manipulating the data organised by the appropriate data model.
- Two classes of language:-

i) PURE → used for providing proving properties about computational power and for optimization.

→ Relational Algebra

→ Tuple relational calculus

→ domain relational calculus

ii) Commercial: used in commercial systems.

→ SQL is most widely used commercial language.

SQL (STRUCTURED QUERY LANGUAGE):

→ most widely used commercial database language.

→ SQL is not a TURING Machine equivalent language.

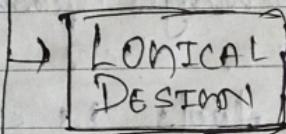
→ that means it can't perform all the tasks like PYTHON or JAVA can.

→ SQL is usually embedded in some higher level language.



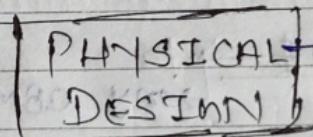
DATABASE DESIGN

→ Process of designing the general structure of database.



→ deciding on the Schema of database.

→ Database design Requires that we find a good collection of RELATION Schema.



→ deciding on the physical layout of the database.

OBJECT-RELATIONAL DATA MODEL

→ OROM blend the features of OOP with the relational database model to provide a more comprehensive way of managing data.



XML: Extensible Markup Language

→ defined by W3C consortium (W3C), which is an organization which gives standard and guidelines to help everyone built a web based application.

→ Originally meant as document markup language but was later-on used as database language.

- Capabilities to specify new tags and create nested tags.
- XML has become the basis for all new generation data interchange formats.
- A wide variety of tools is available for parsing, browsing and querying XML documents / data.



DATABASE ENGINE →

Many DBMS app like SQL, COBOL etc.

- 3 major components of DBMS are:

- STORAGE MANAGER
- QUERY PROCESSING
- TRANSACTION MANAGER

STORAGE MANAGER

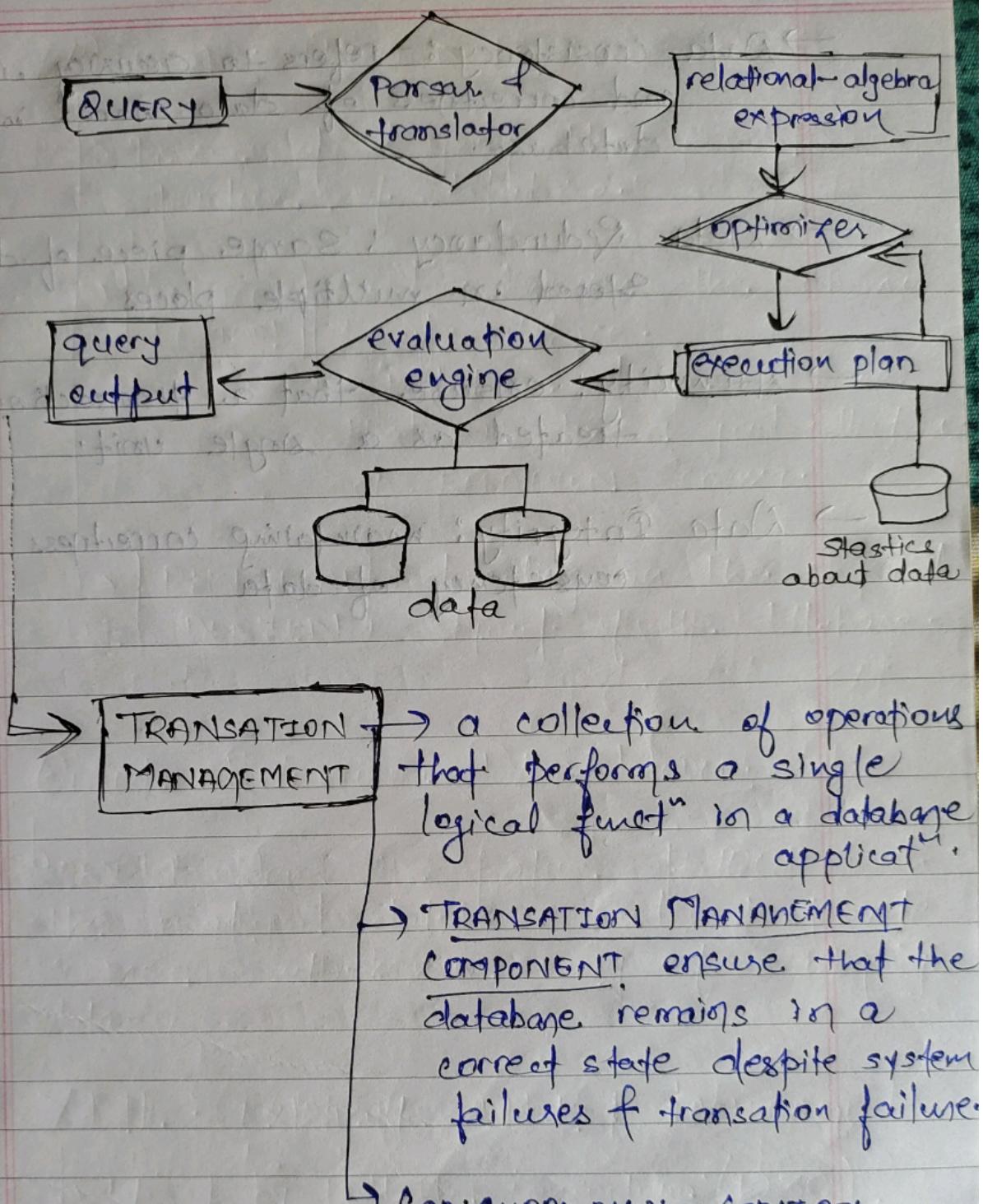
→ It is a program module that provides interface b/w low level data & application programs and queries.

ISSUES:

- Storage access
- File organisation
- Indexing & hashing

QUERY PROCESSING

- Parsing & translation
- Optimization
- Evaluation



CONCURRENCY - CONTROL MANAGER, controls the interaction among the concurrent transaction, to ensure the consistency of the database.

- Data consistency :- refers to accuracy , reliability and correctness of data stored in a database.
- Data Redundancy : Same piece of data is stored in multiple places
- Atomicity : ensure that a transaction is treated as a single unit.
- Data Integrity : maintaining correctness and consistency of data