

Assignment - 1

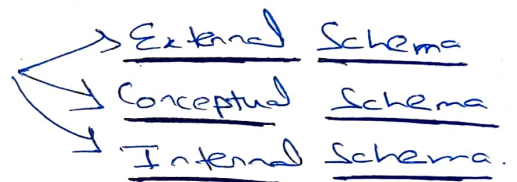
ADBS

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Q1 Discuss three schema architecture in detail.
How does it support data independence & enhance overall manageability of database.

The three schema architecture enables multiple users to access the same data with a personalised view while storing underlying data only once.

It consists of three levels



- External Schema
- Conceptual Schema
- Internal Schema

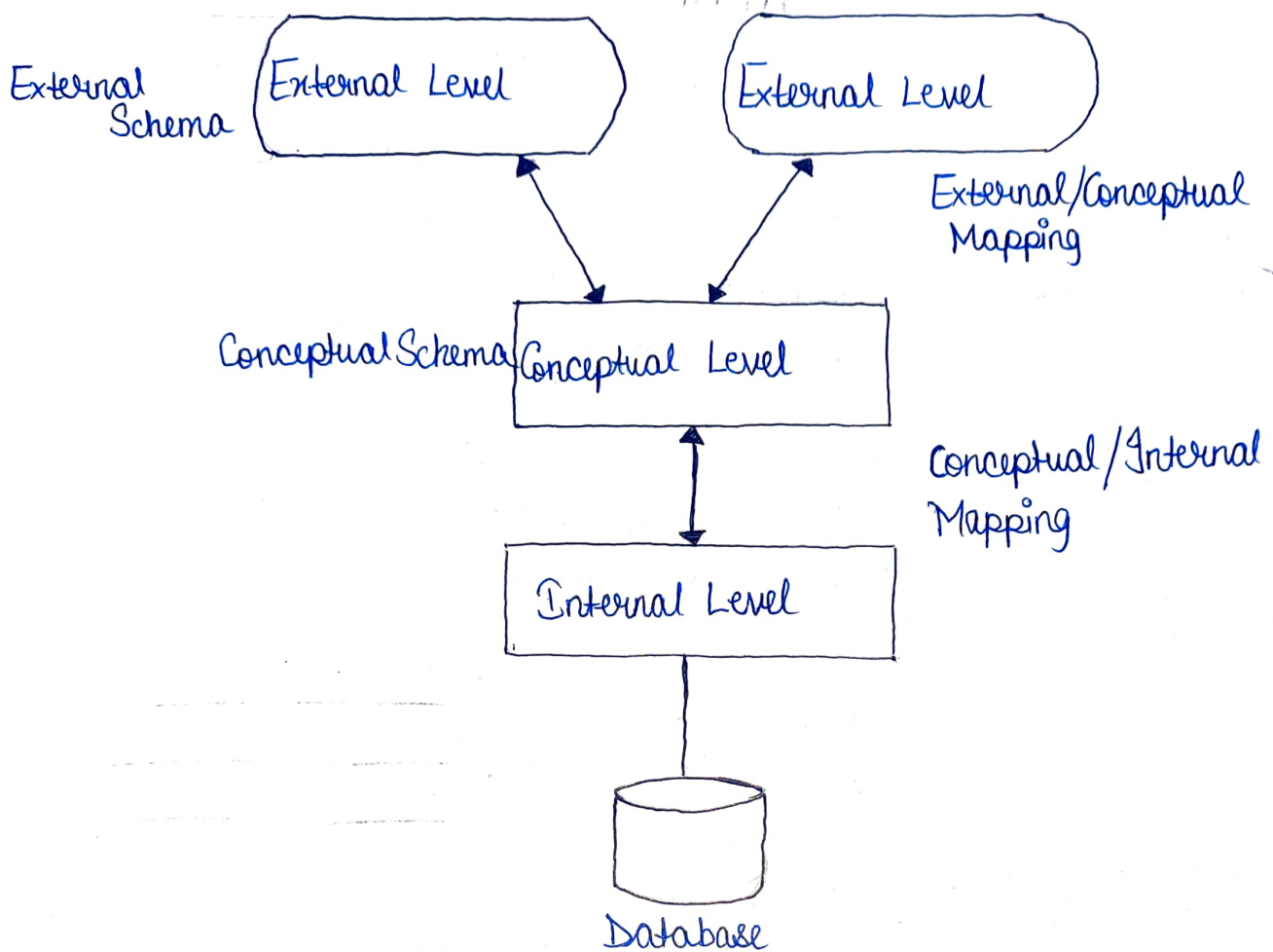
External Schema: It represents the user views allowing different users to have different perspectives of the database.

Conceptual Schema: It provides a global view of the entire database.

- Changes made in conceptual schema are reflected in all external schemas ~~including~~ ensuring consistency across different views of data.

Internal Schema

- Represents how data is physically stored in database system.
- Defines the data structures, access methods, & storage organizations used to store & retrieve data efficiently.

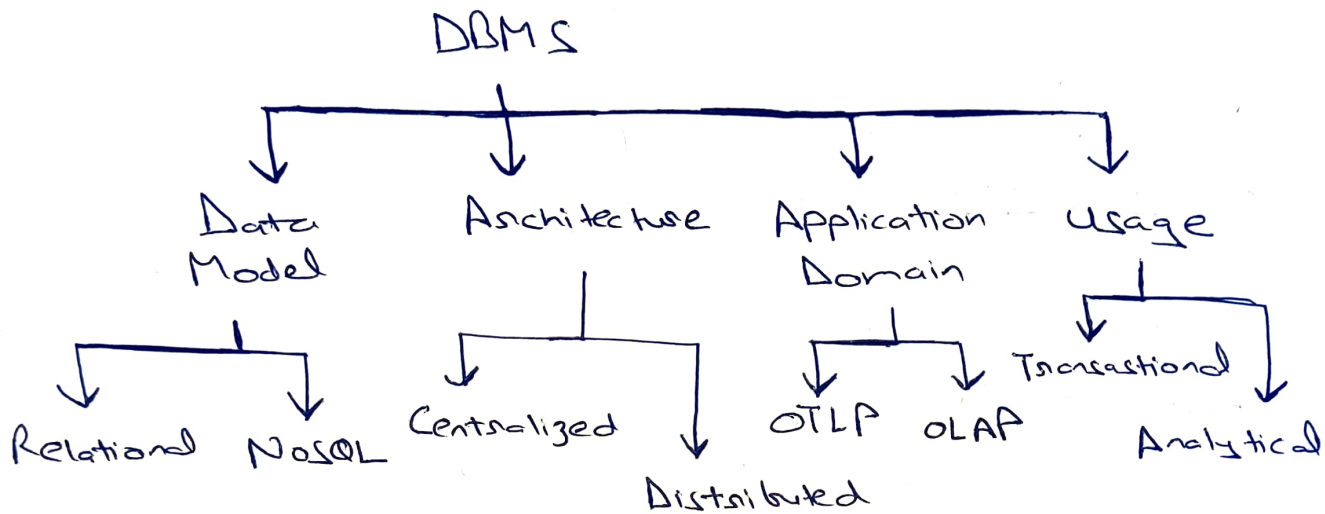


3 schema Architecture

- The three schema architecture enables data independence, simplifies schema modifications, enhances security, facilitates data integration & provides a clear framework for database design & maintenance in large scale systems.

Q2. Classify DBMS based on various criteria such as data model, architecture, and application domain. Provide real world examples for each classification.

DBMS can be classified into -



① Data Model

- Relational: Organizes data into tables with predefined schema & relationships.
eg. MySQL, PostgreSQL
- NoSQL: Offers flexible schema & handles unstructured data too eg. MongoDB.

② Architecture

- Centralized: Operates on a single layer, suitable for small scale application.
- Distributed: Spreads data across multiple nodes enhancing scalability & fault tolerance
eg. Amazon DynamoDB.

③ Application Domain

- OLTP Online transaction Processing - optimized for handling high volumes of transactions with low latency common in e-commerce sites.
- OLAP Online Analytical Processing - Designed for complex queries & data analysis, used in decision support systems eg. Google BigQuery.

④ Usage

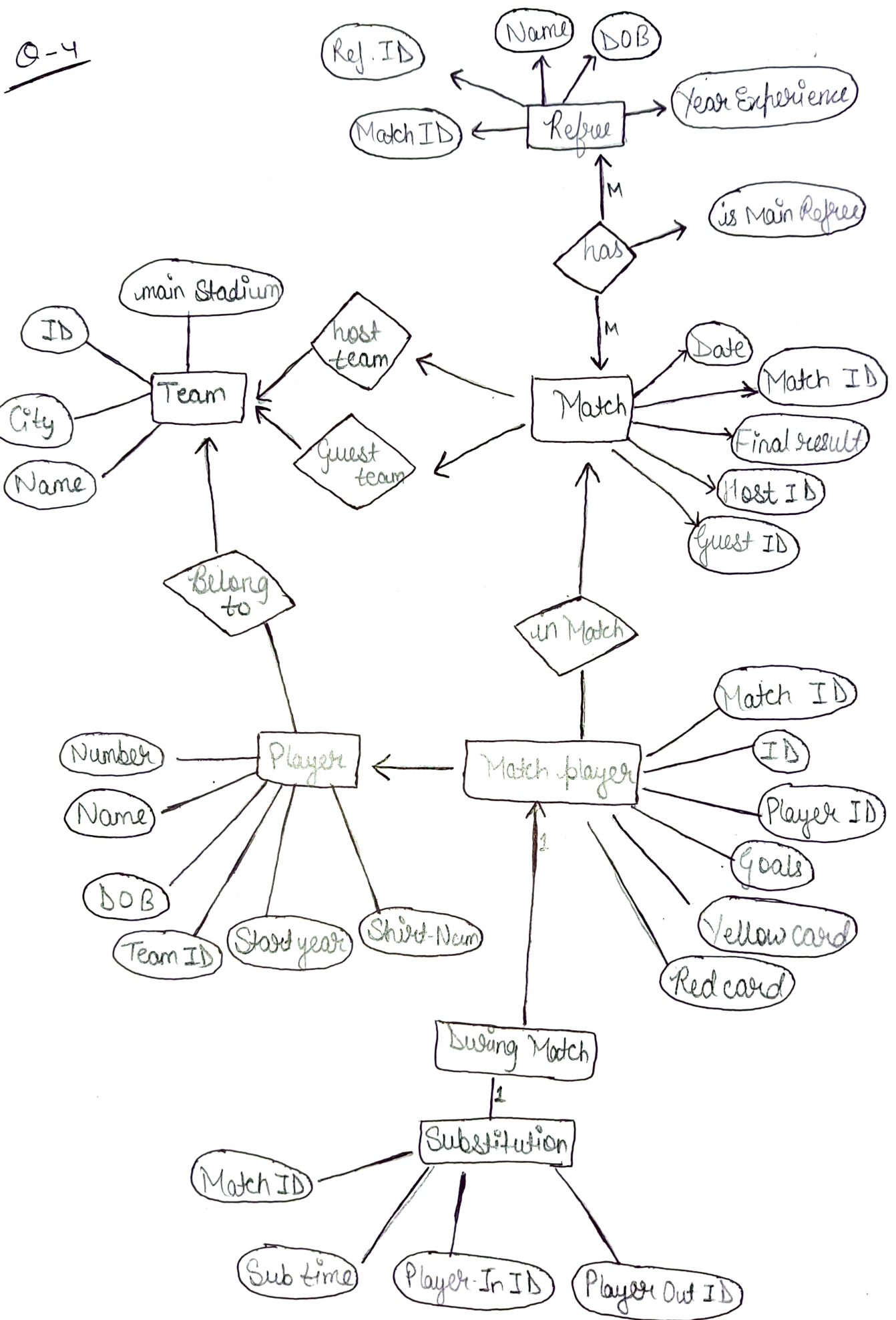
- Transactional Prioritizes consistency & quick transaction processing, ideal for daily operations eg. MySQL
- Analytical Emphasizes query performance & analytics, facilitating business intelligence & reporting. eg. Apache Hive.

Q-3 Explore relational algebra operations including unary & binary, set, join operations. Provide examples of each & explain how they are used to retrieve & manipulate data.

① Unary Operations

- Selection (σ) Selects rows which satisfies the condition.
eg. $\sigma_{\text{age} > 80}$ (Retrieve rows where age > 80)
- Projection (π) Selects column from a relation.
eg. $\pi_{\text{name}}(\sigma_{\text{age} > 80}) \Rightarrow$ selects names of those where age > 80.

Q-4



Q-5 Map ER diagram in Q-4

Create Table Match
(Match-ID int
primary key Date
date, Result varchar
(250));

Create Table Team(
Team-ID int primary
key Name varchar(250)
Main Stadium varchar(250)
City varchar(250));

Create table Substitution
(Match-ID int, Sub-
time time,
player-In-ID int,
player-Out-ID int,
Foreign key (Match-ID)
References Match (Match-ID));

Create table Referee(
Referee ID int primary key,
Name varchar (250),
DOB date,
Year Experience int);

Create Table Player(
number int primary key,
name varchar(250),
DOB date,
Start year year,
Shirt num int,
Team-ID int,
Foreign key (TEAM ID)
References team (Team ID));

Create table Match player(
Match-ID int,
player-ID int
Goals int
Yellow Card boolean,
Red Card boolean,
Primary key (Match ID, Player ID)
Foreign key (Match ID) References
Match (Match-ID));

Create table Referee C
Match-ID int,
Ref-ID int,
Role ENUM (Main Referee,
Assistant Referee),
Primary key (Match ID Referee ID)
Foreign key (Match ID)
Reference Match (Match ID)
Foreign key (Referee ID)
References Referee (Referee ID)