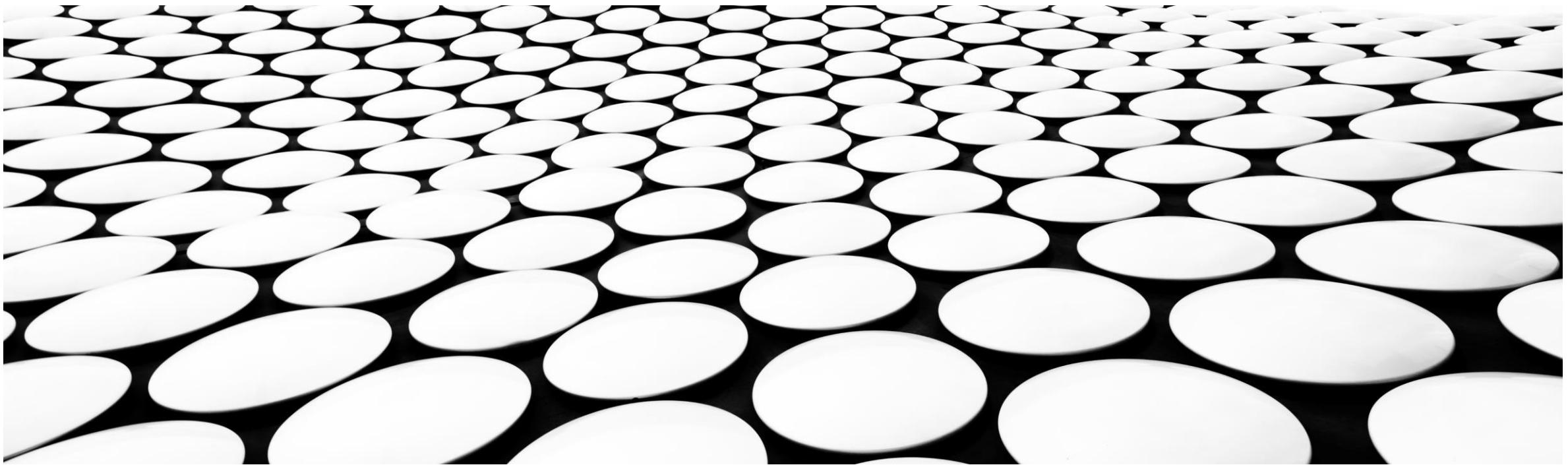




DATABASE FUNDAMENTALS



Content:

- Database concepts

- Database systems Main components

- Database Users

- DBMS Architecture , Data Models

- Mappings

- DBMS other functions

- Centralized Database Environment

- Distributed Database Environment

- Conclusion



**Database
interact with:**



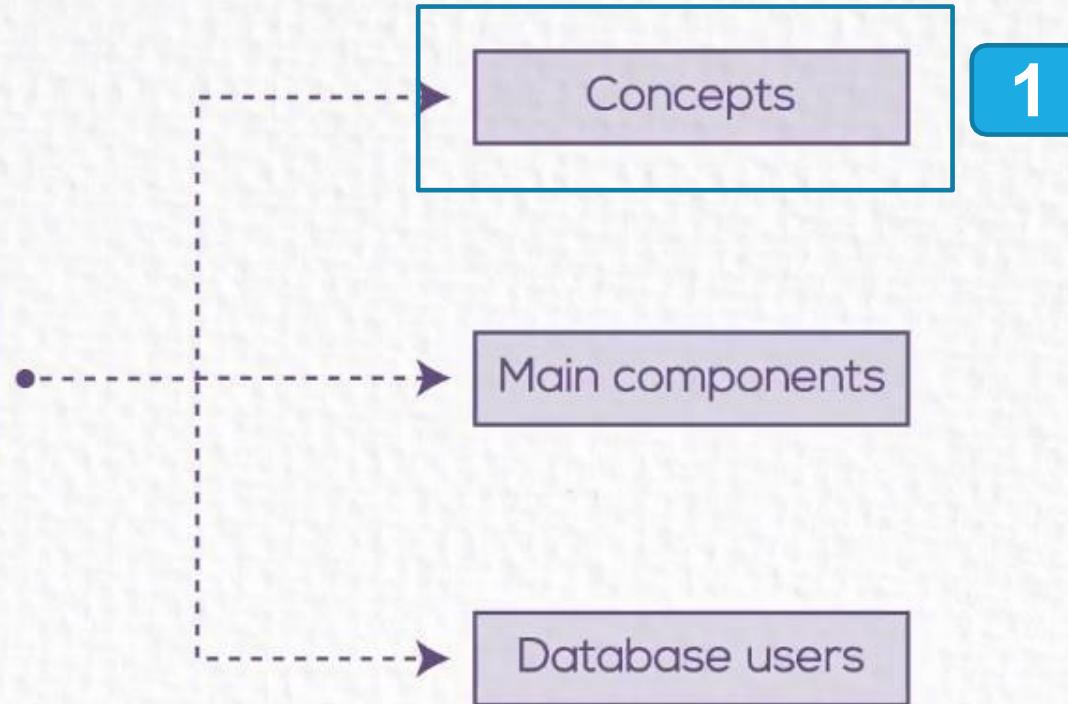
E-commerce



Super Market



E-Mail



Concepts

File Based System

File Based System



Finance dept.



HR dept.



Excel Sheet



Word file

File Based System



Finance dept.



HR dept.



Excel Sheet

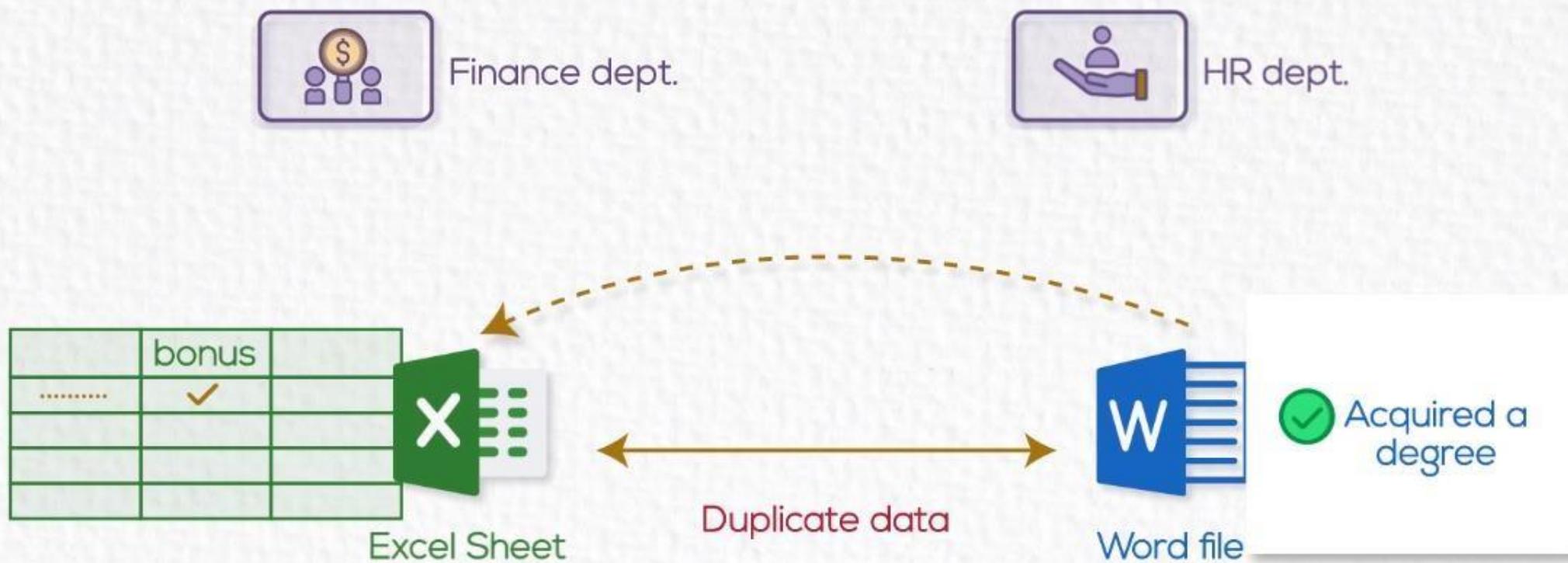


Word file



Duplicate data

File Based System



File Based System



Finance dept.



HR dept.



Isolation Of data
Incompatible file formats



Duplicate data



Word file



Acquired a
degree



Limitations Of **File Based System**

- Separation & Isolation Of data.
- Duplication of data
- Program Data Dependence
- Incompatible file formats

File Based System



Database

- A collection of related data.

File Based System

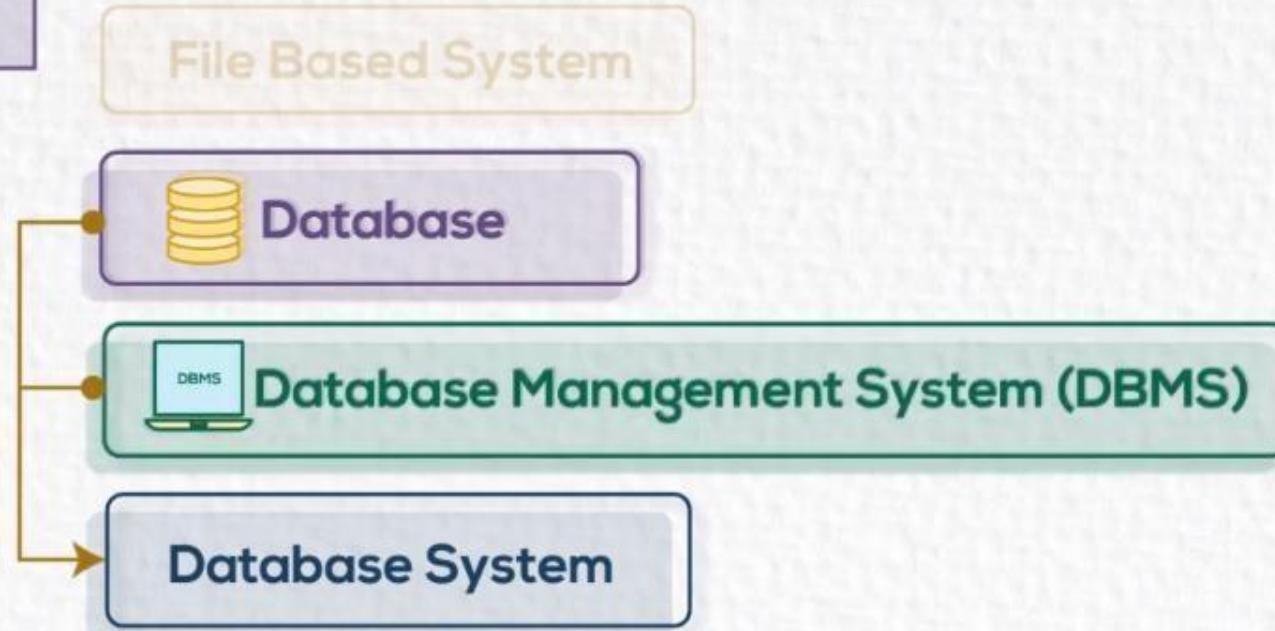


Database

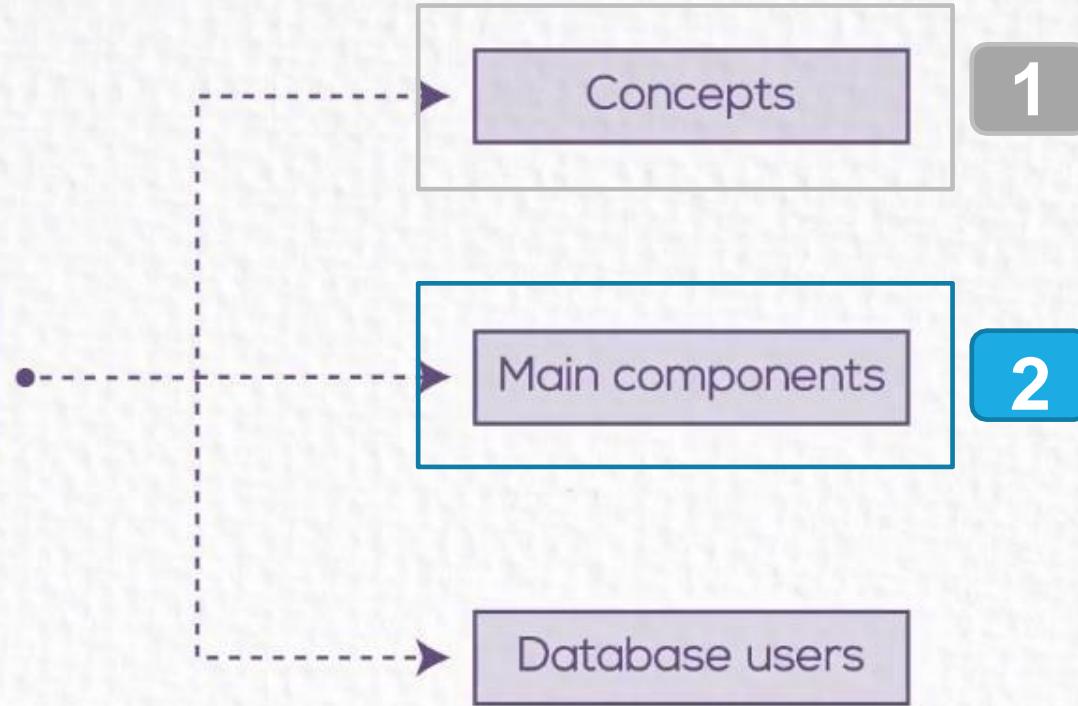
Database Management System (DBMS)

- A software package/ system to facilitate the creation and maintenance of a computerized database.

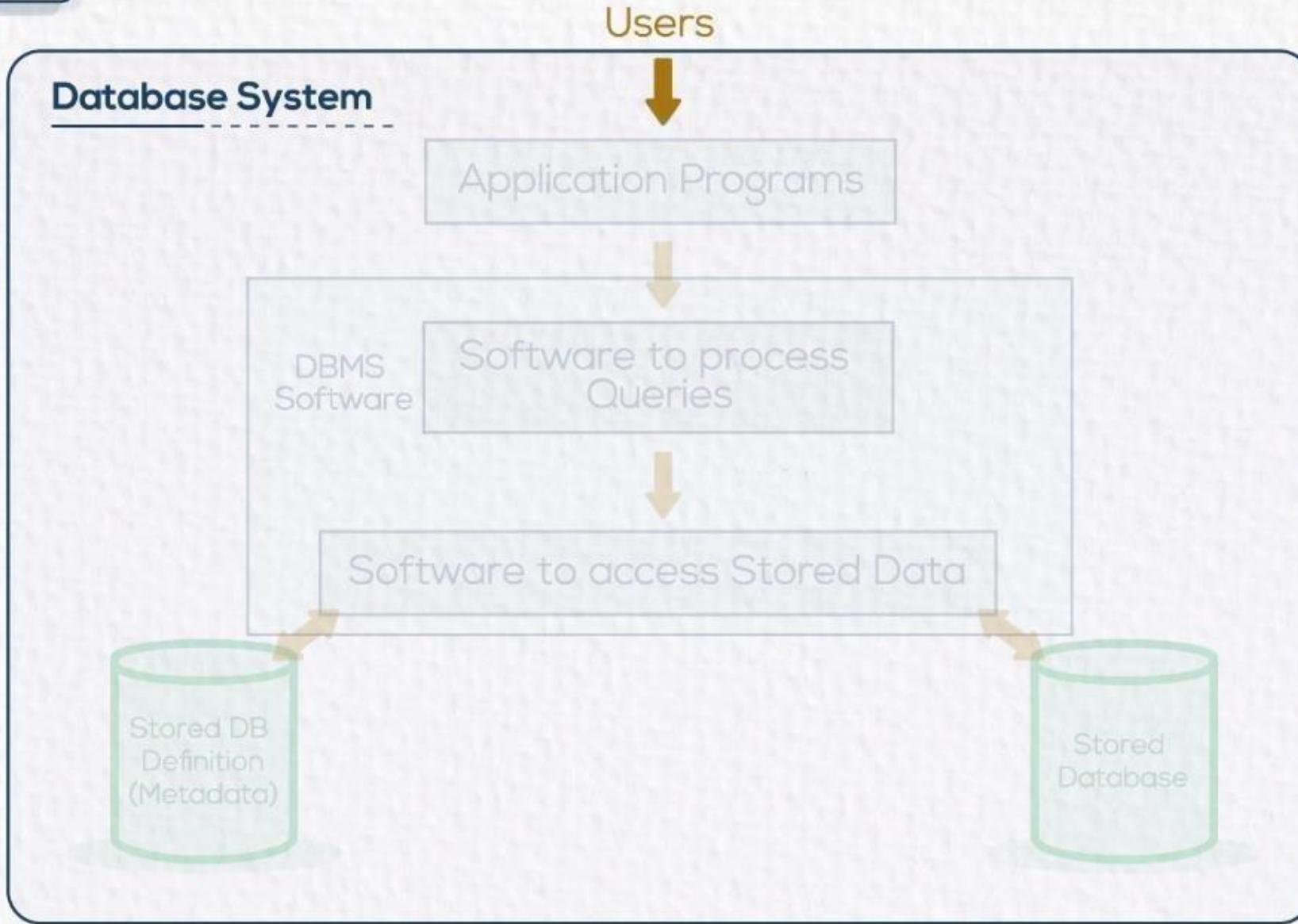


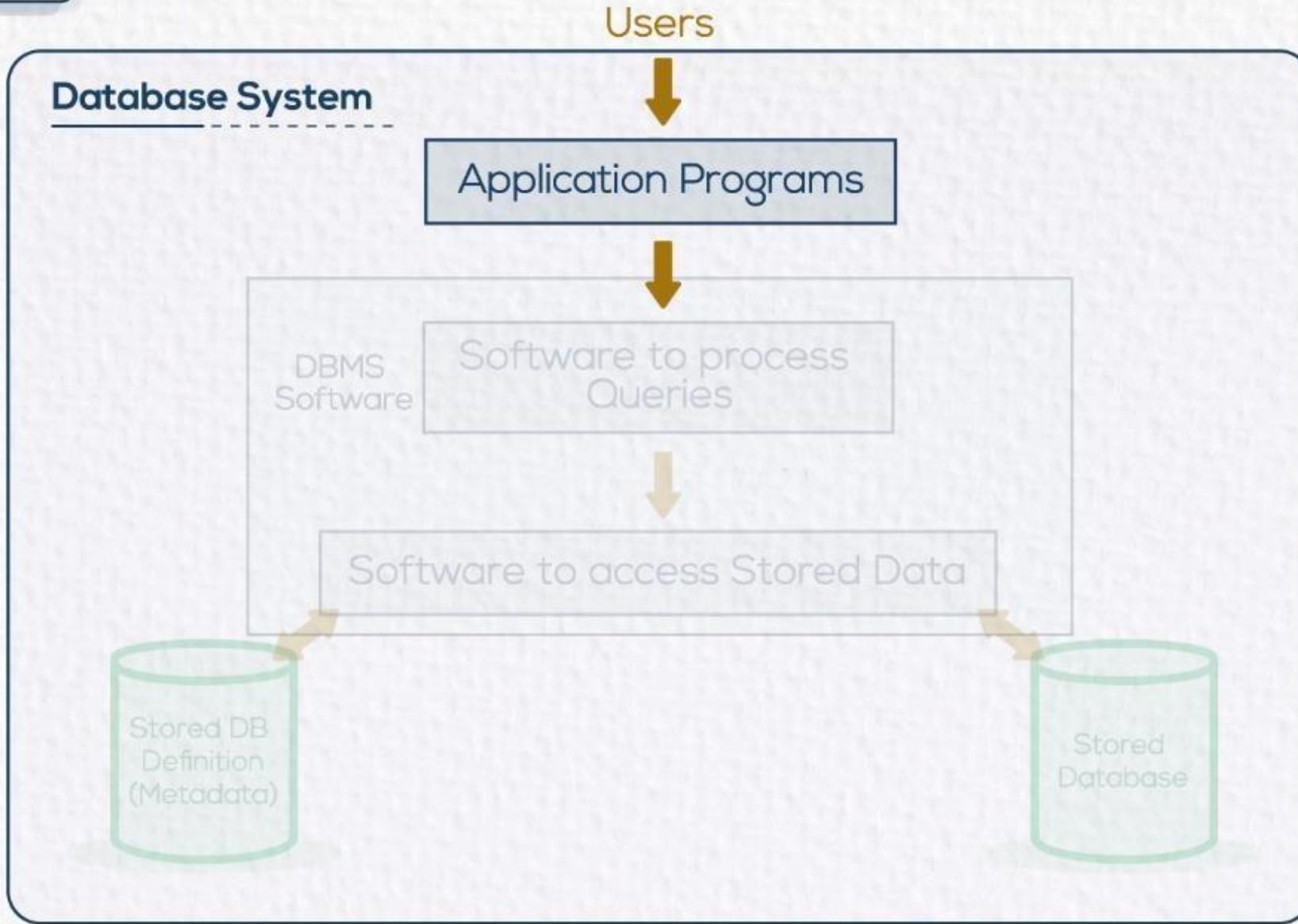


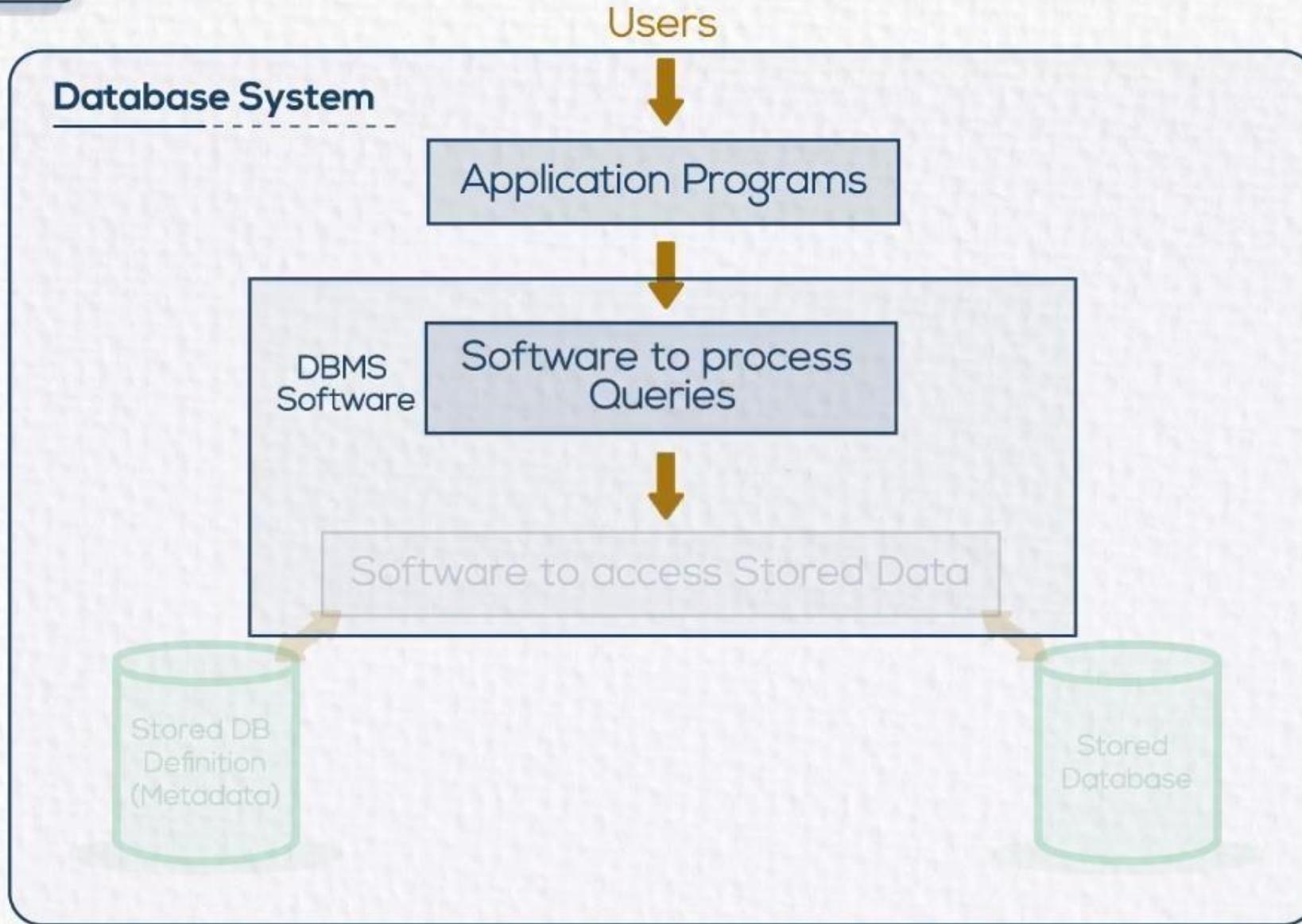
- The DBMS software together with the data itself. Sometimes, the applications are also included. **(Software + Database)**

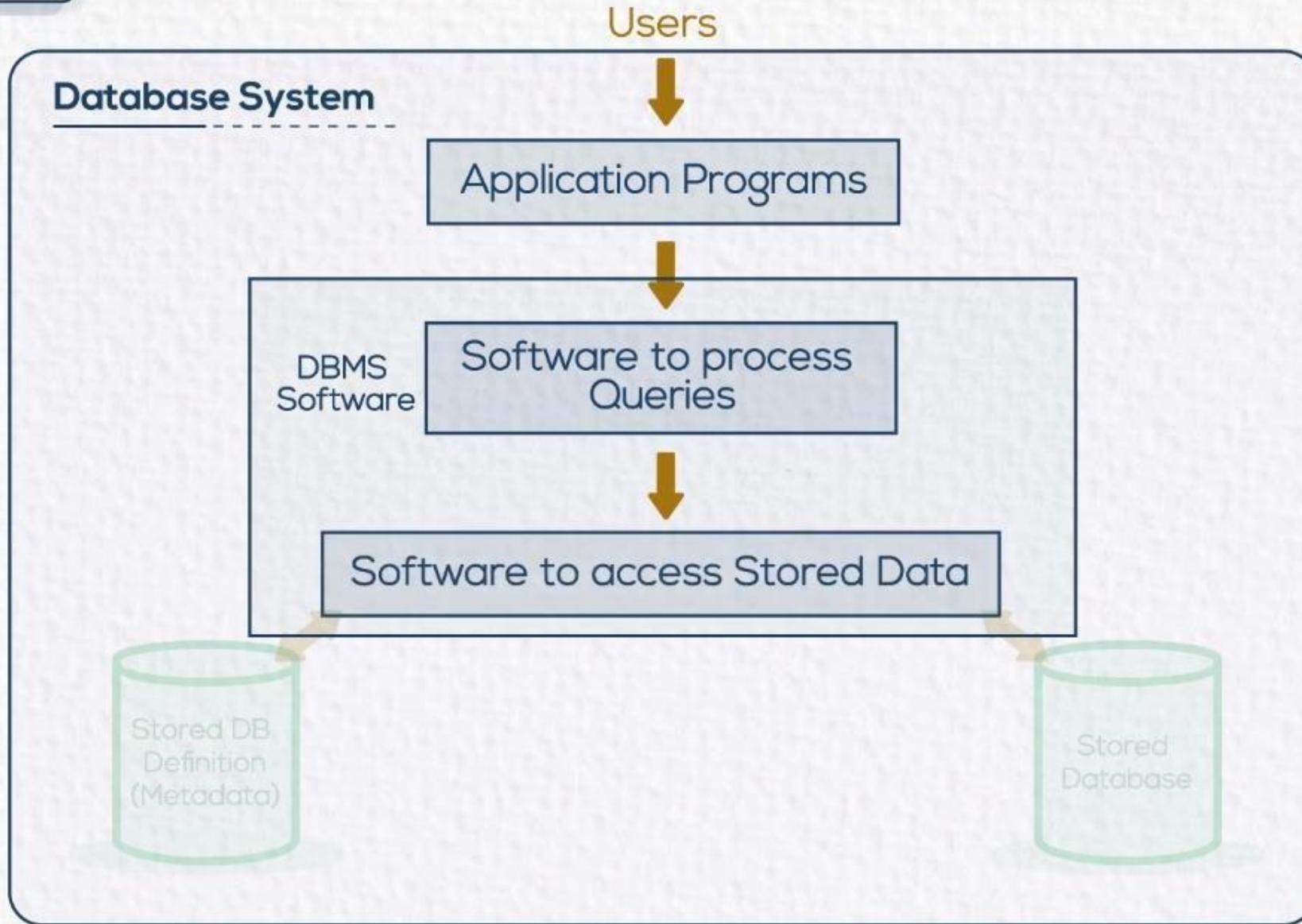


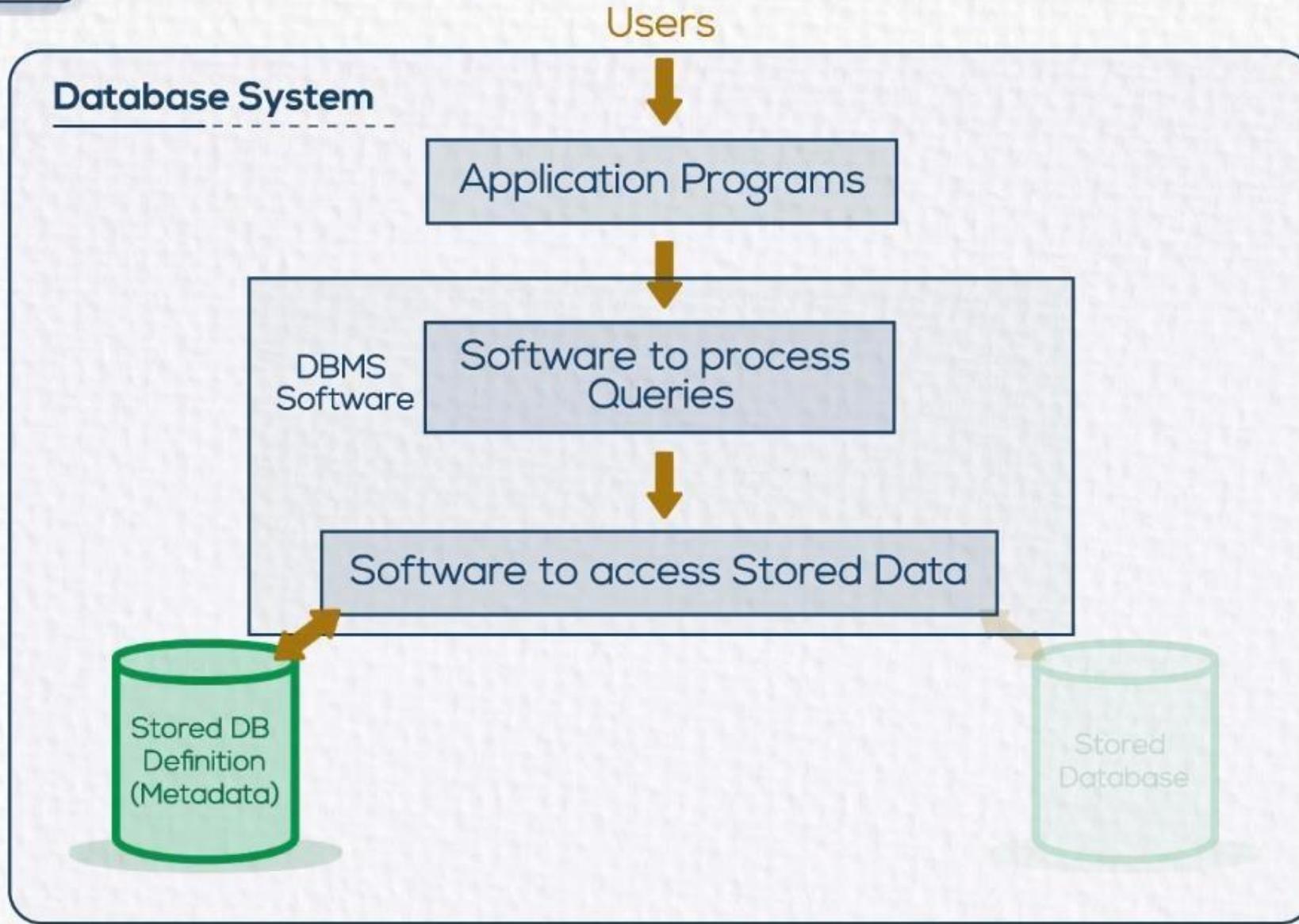
III

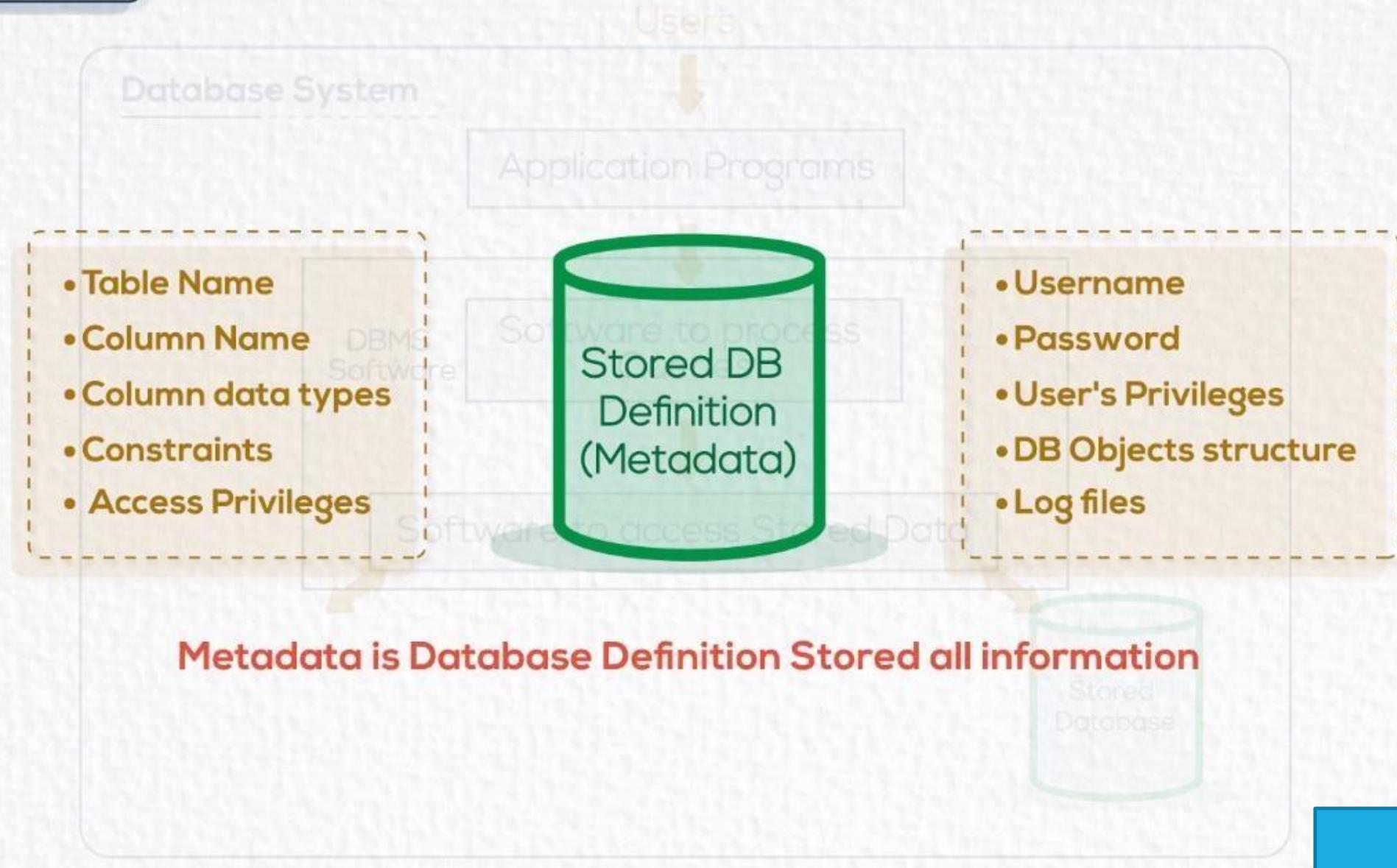


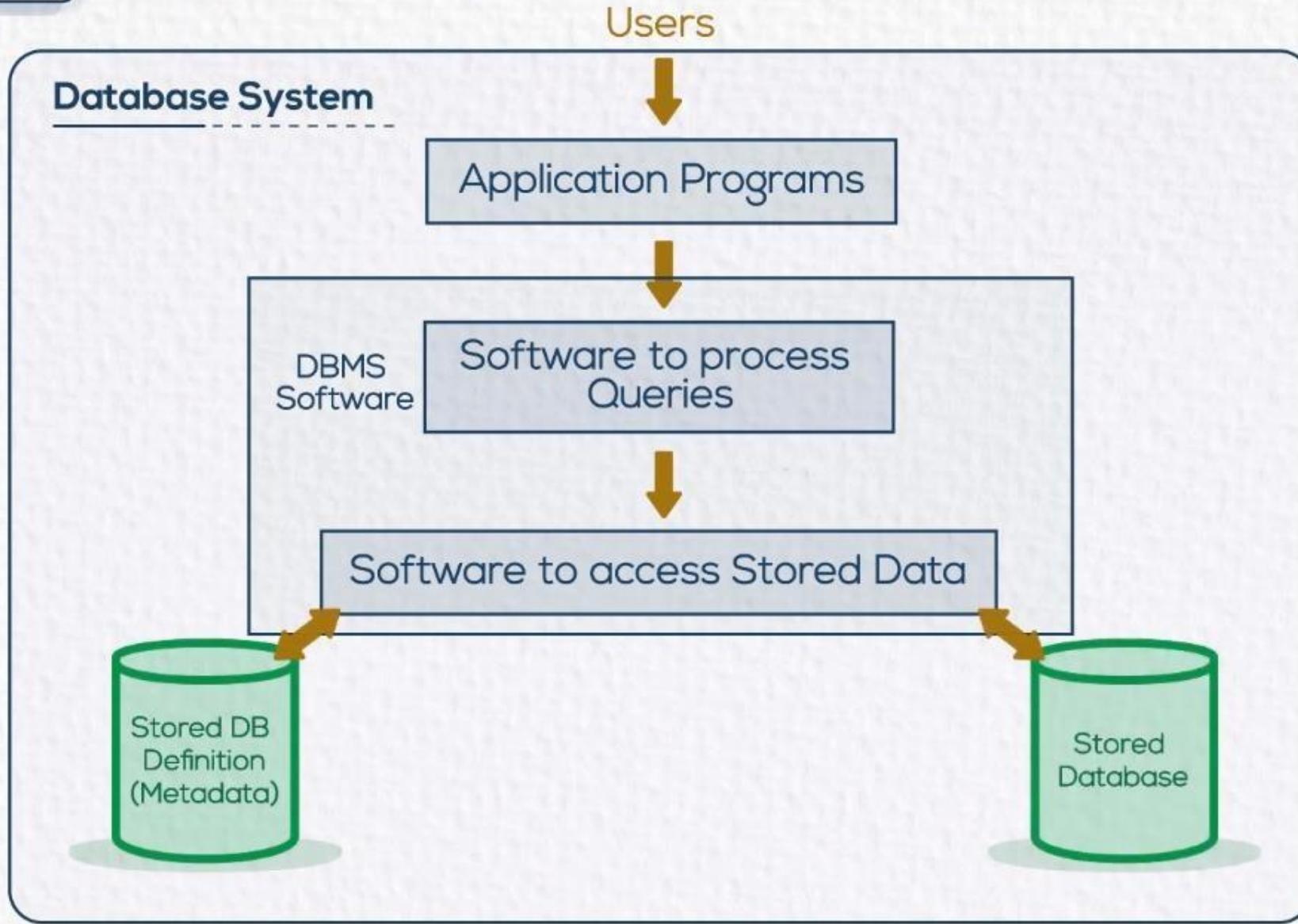






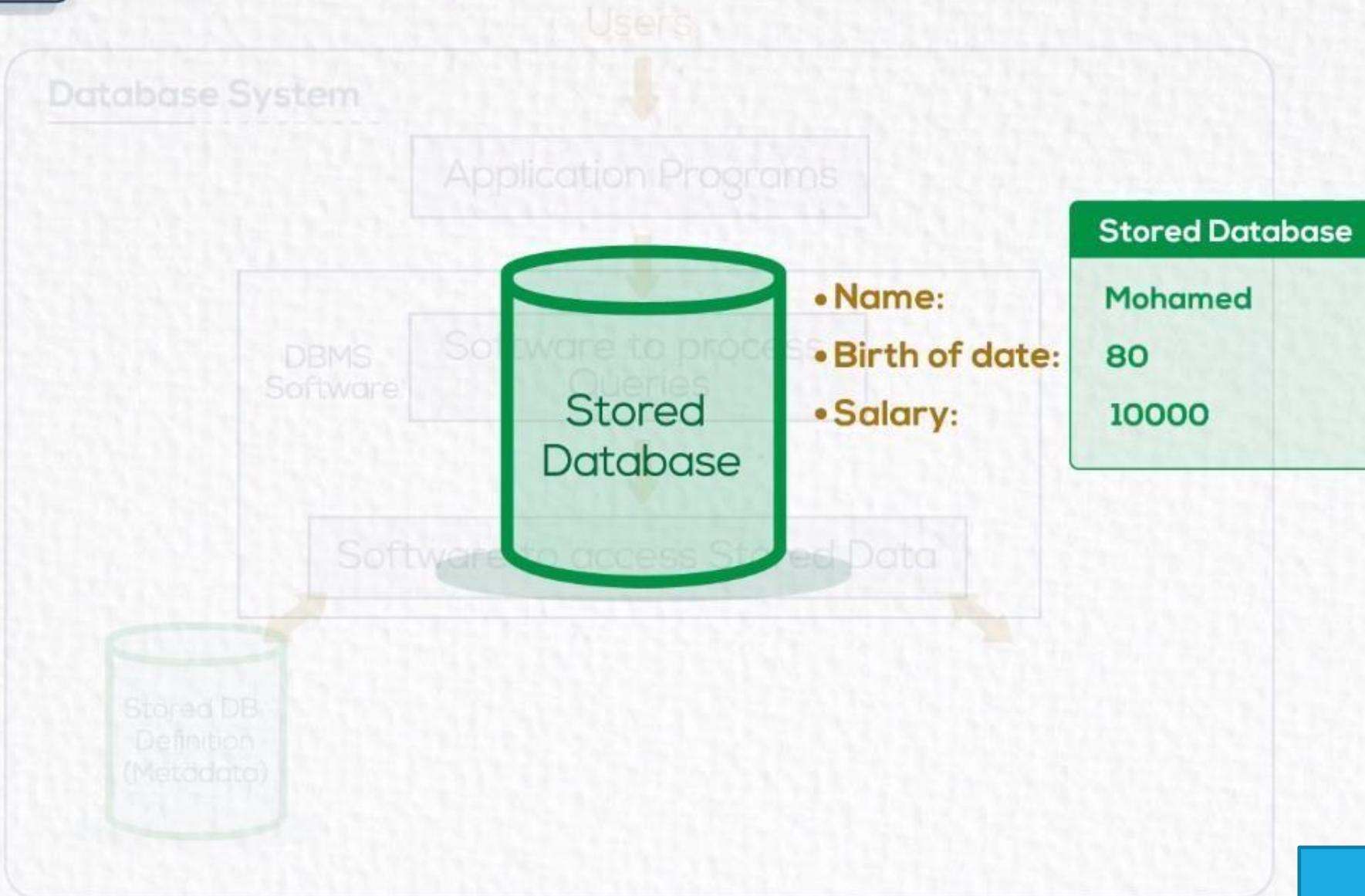






Database System

• Main components



Database Systems

Advantages

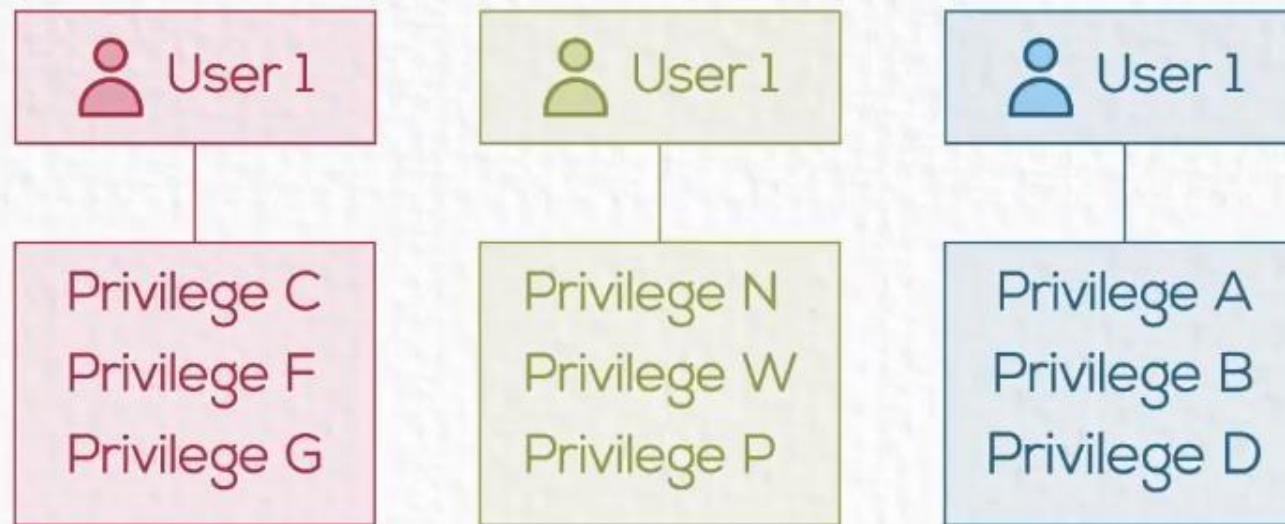
Database systems **advantages**

- Controlling Redundancy.



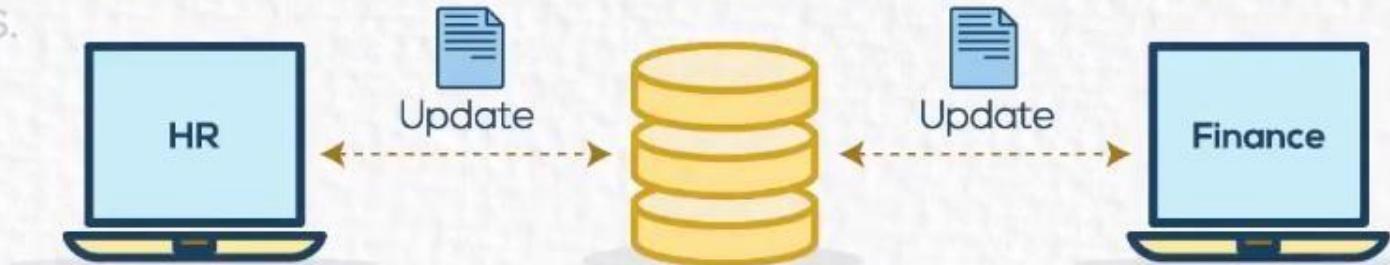
Database systems **advantages**

- Controlling Redundancy.
- Restricting Unauthorized Access.



Database systems **advantages**

- Controlling Redundancy.
- Restricting Unauthorized Access.
- Sharing data.



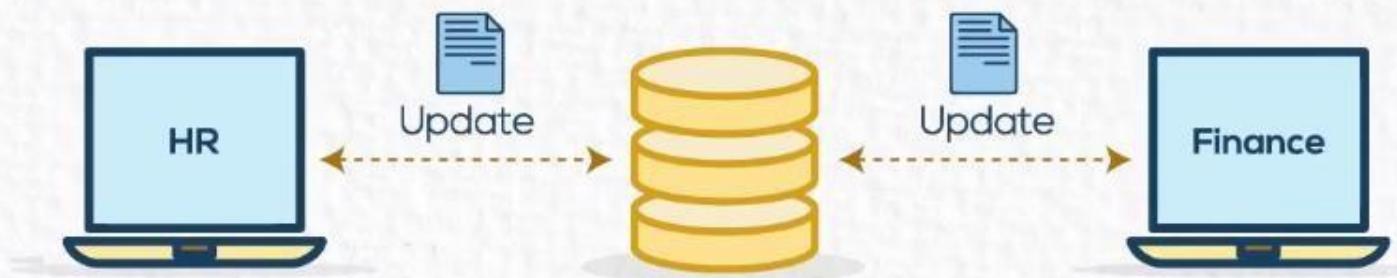
Database systems **advantages**

- Controlling Redundancy.
- Restricting Unauthorized Access.
- Sharing data.
- Enforcing Integrity Constraints.

Integrity of data	
Phone number	ID
 123456	 123
 Text	 456
 789101	 456

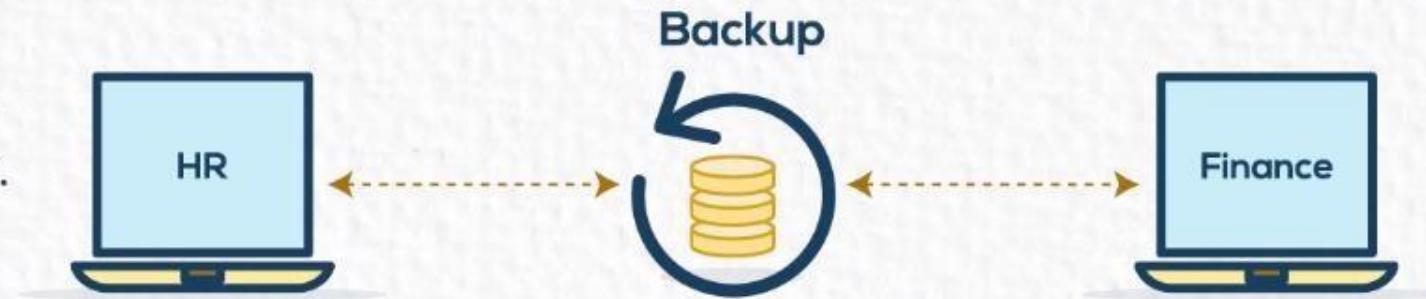
Database systems **advantages**

- Controlling Redundancy.
- Restricting Unauthorized Access.
- Sharing data.
- Enforcing Integrity Constraints.
- Inconsistency can be avoided.



Database systems **advantages**

- Controlling Redundancy.
- Restricting Unauthorized Access.
- Sharing data.
- Enforcing Integrity Constraints.
- Inconsistency can be avoided.
- Providing Backup and Recovery.



Database Systems

Disadvantages

Database systems **disadvantages**

- Needs expertise to use.

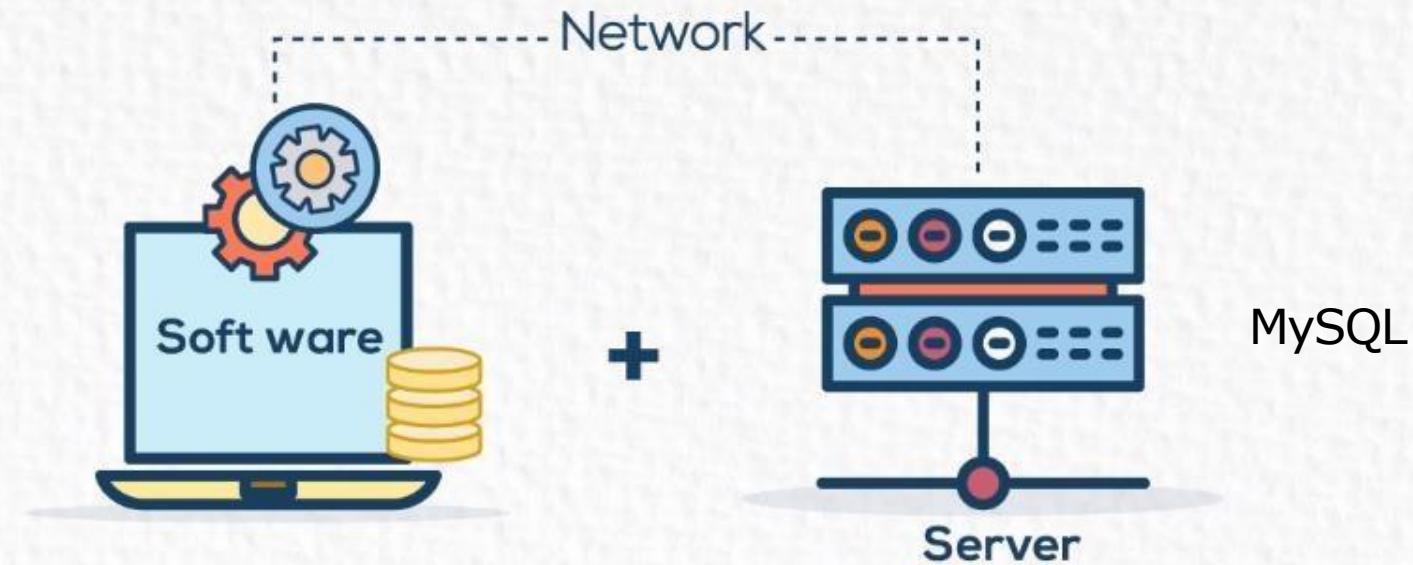
Database systems **disadvantages**

- Needs expertise to use.
- DBMS is expensive.

	Support DBMS
	Database
	User

SQL Server

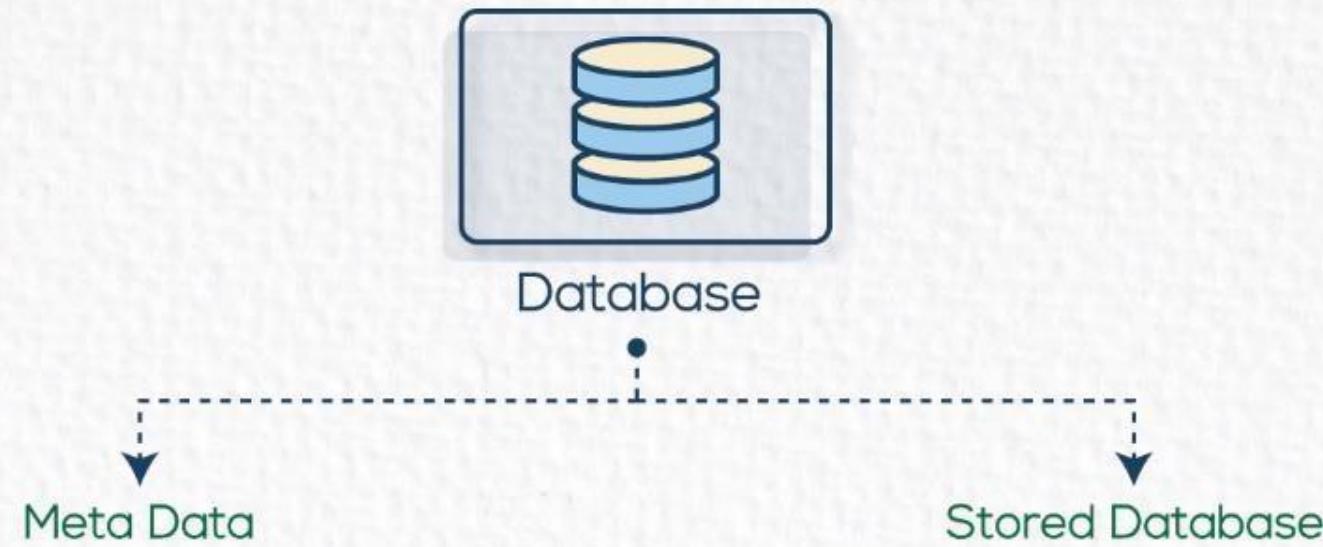
Oracle DB



MSACCESS

Database systems **disadvantages**

- Needs expertise to use.
- DBMS is expensive.
- May be incompatible with any other available DBMS.



DBMS Functions

- Defining Database.
- Constructing Database.
- Manipulating Database.
- Data Independence.
- Data Security & Integrity.
- Concurrency.
- Backup & Recovery.
- Data Dictionary (Meta Data).
- Performance.

Database main and most known Types

- Relational.
- NOSQL
- Objected oriented Databases.

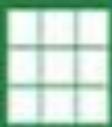
NoSQL

Key/Value



- Windows Azure Blob Storage
- Windows Azure Table Storage
- Windows Azure Cache
- Redis
- Memcached
- Riak

Column Family



- Cassandra
- HBase

Document



- MongoDB
- RavenDB
- CouchDB

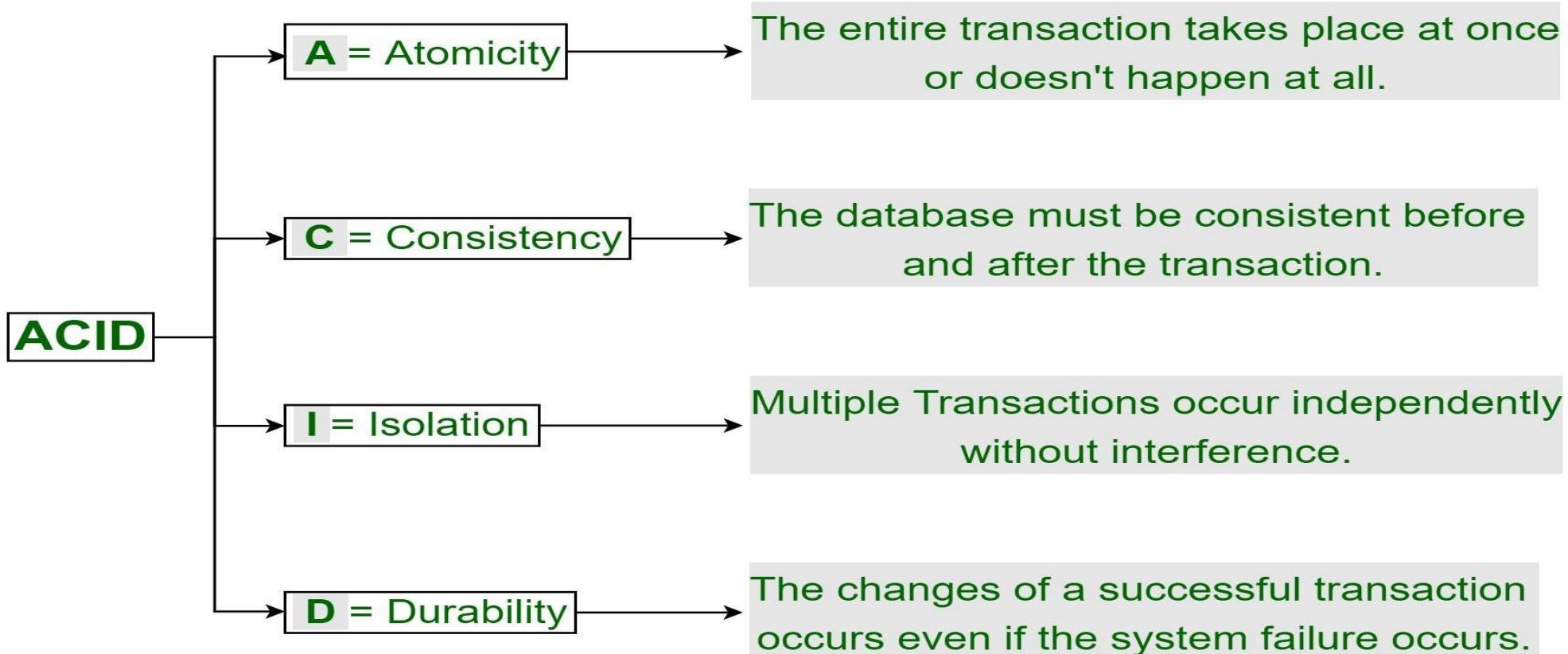
Graph



- Neo4J

ACID Properties

ACID Properties in DBMS

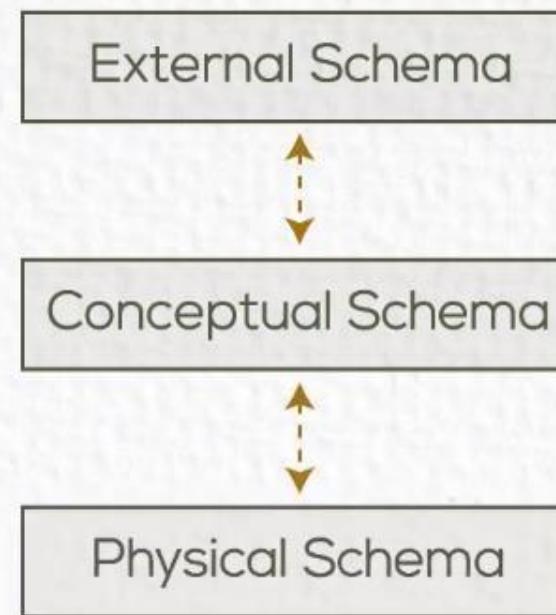


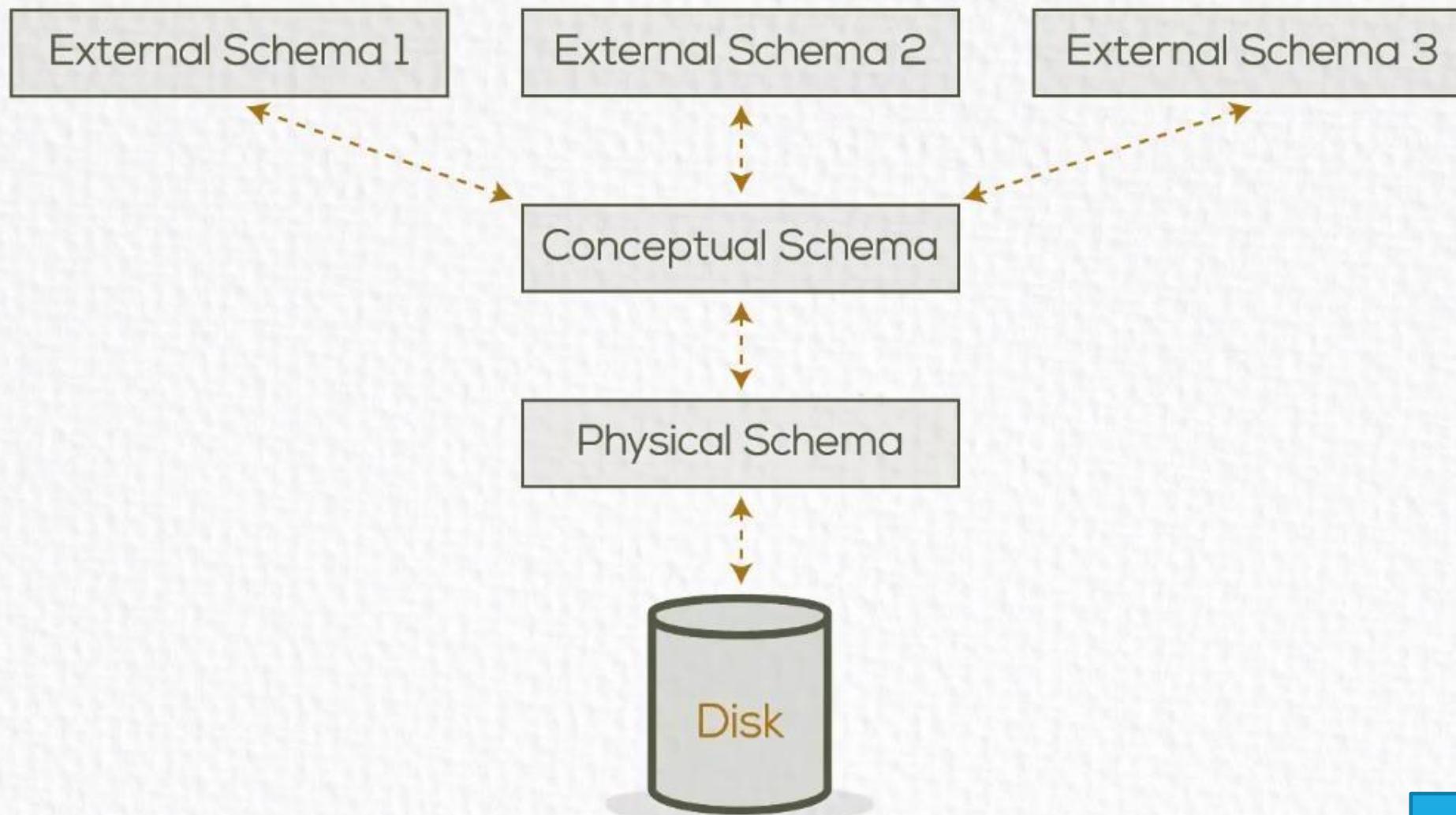


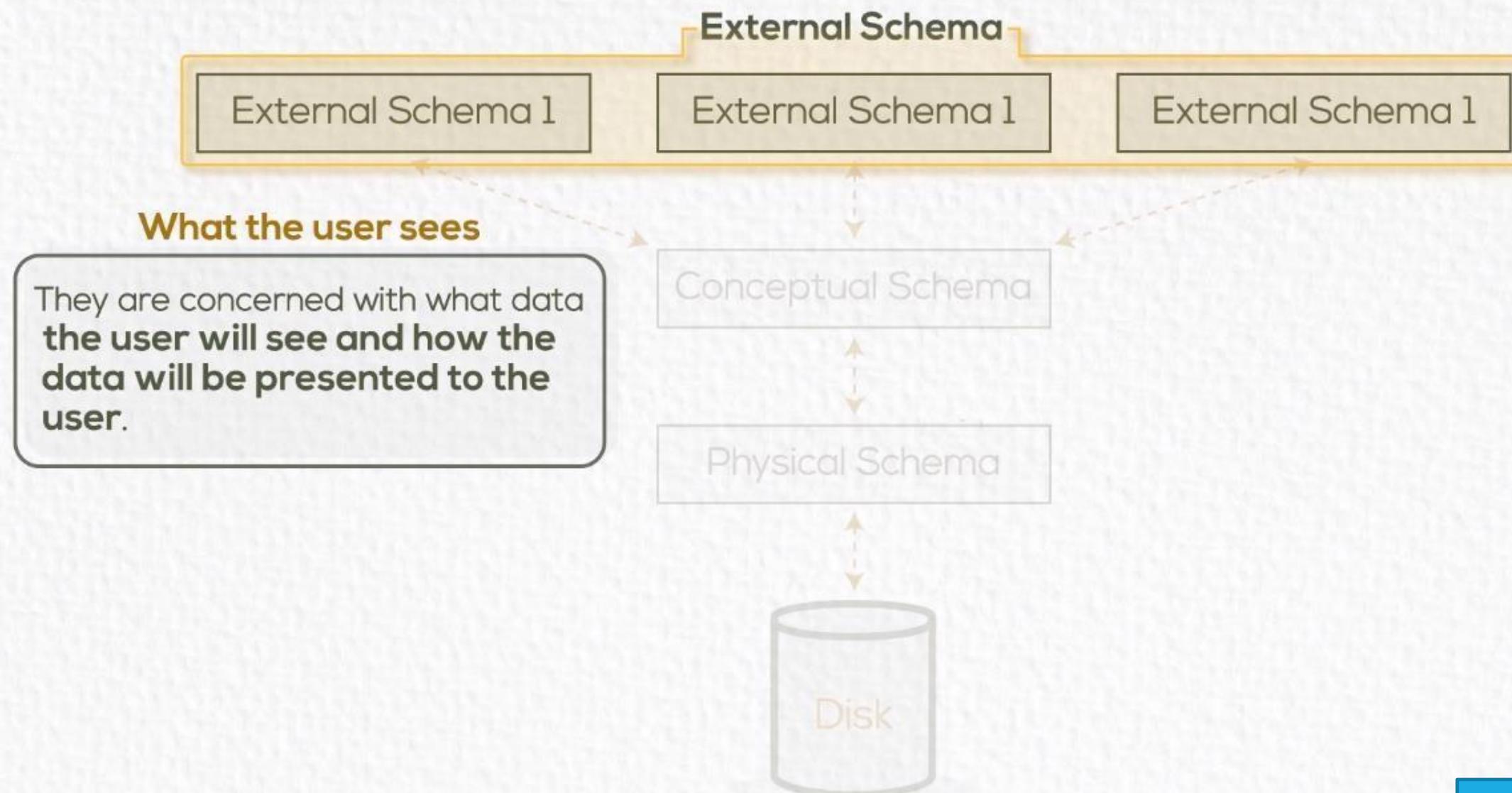
DBMS Architecture

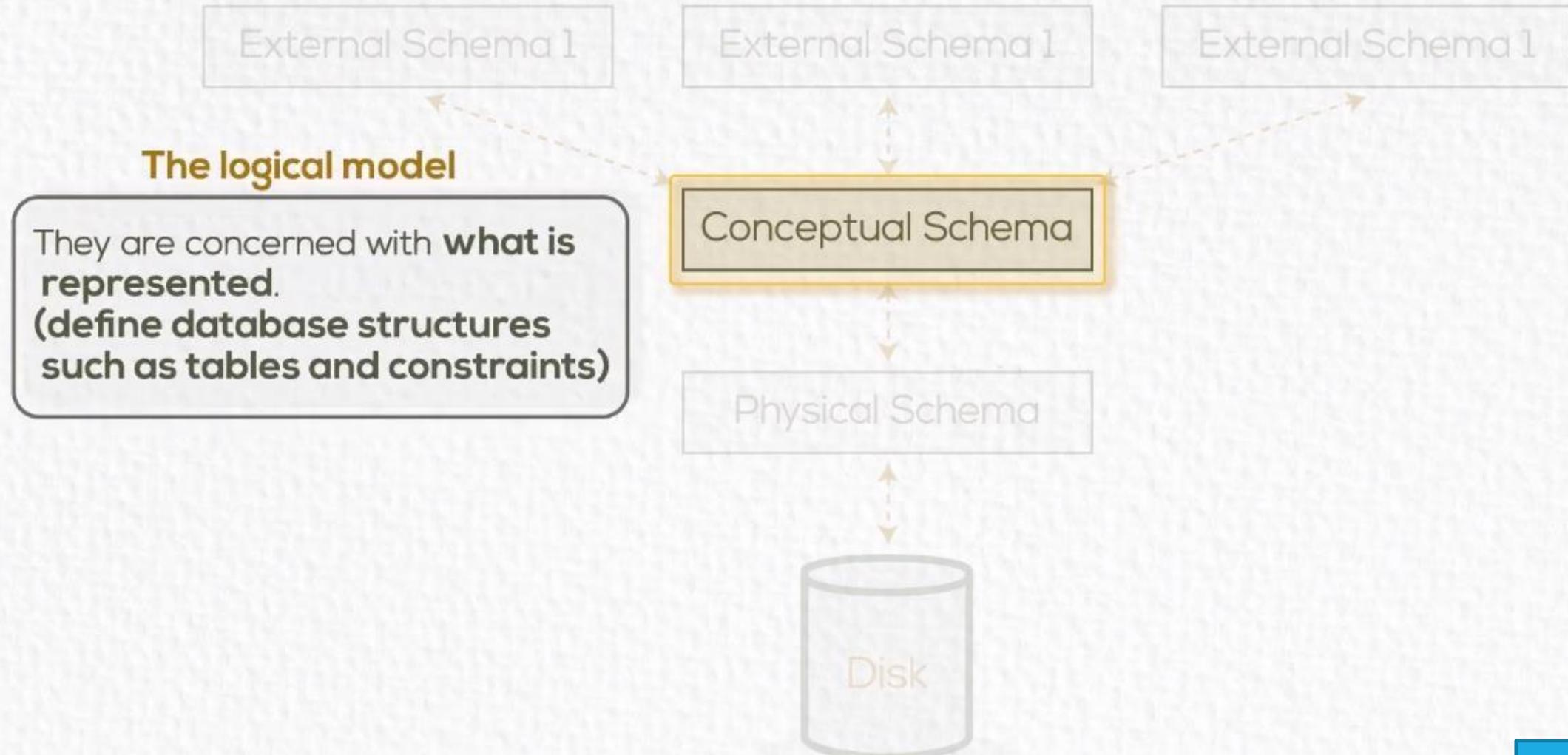
(Three Schema Architecture)

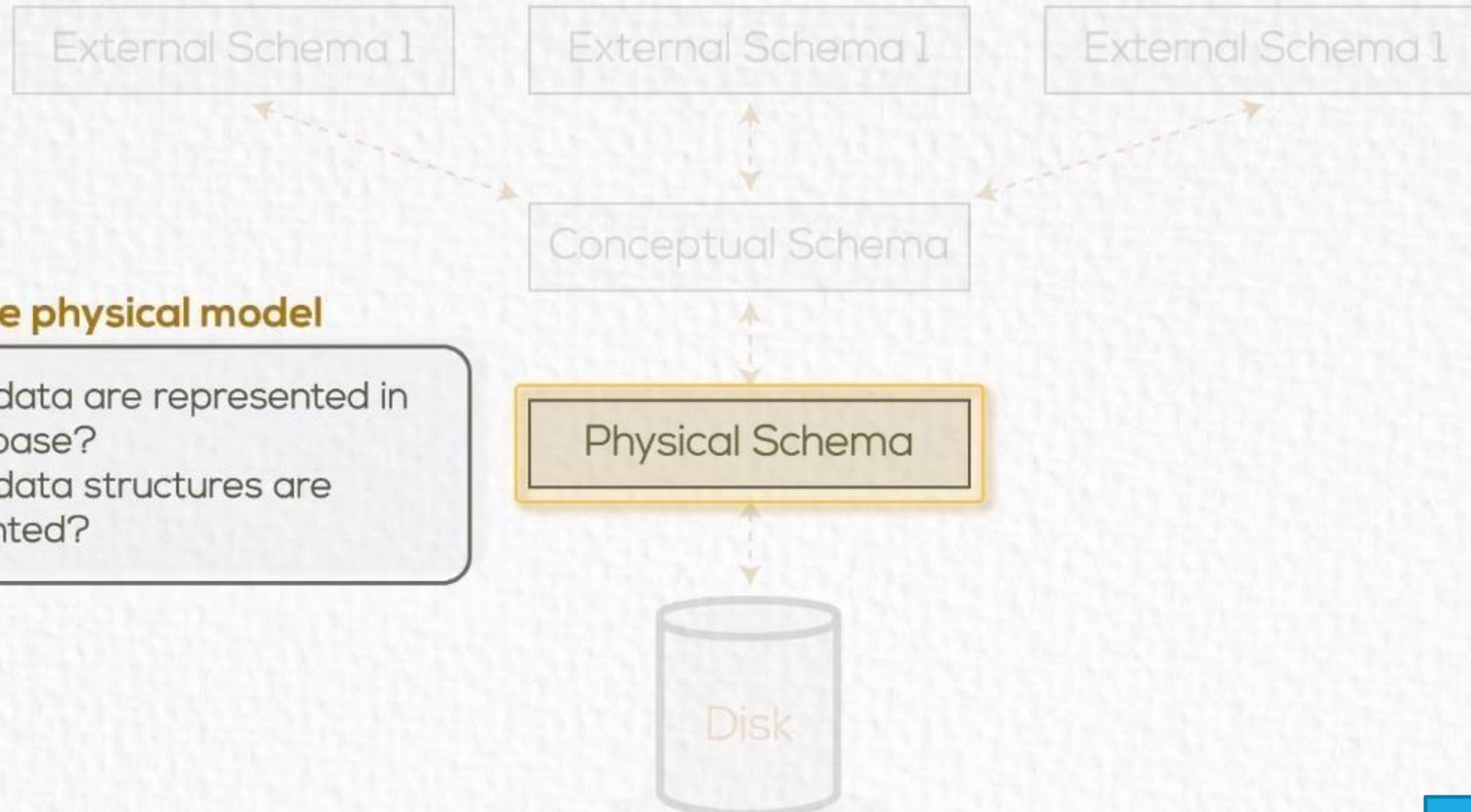
DBMS Architecture (Three Schema Architecture)

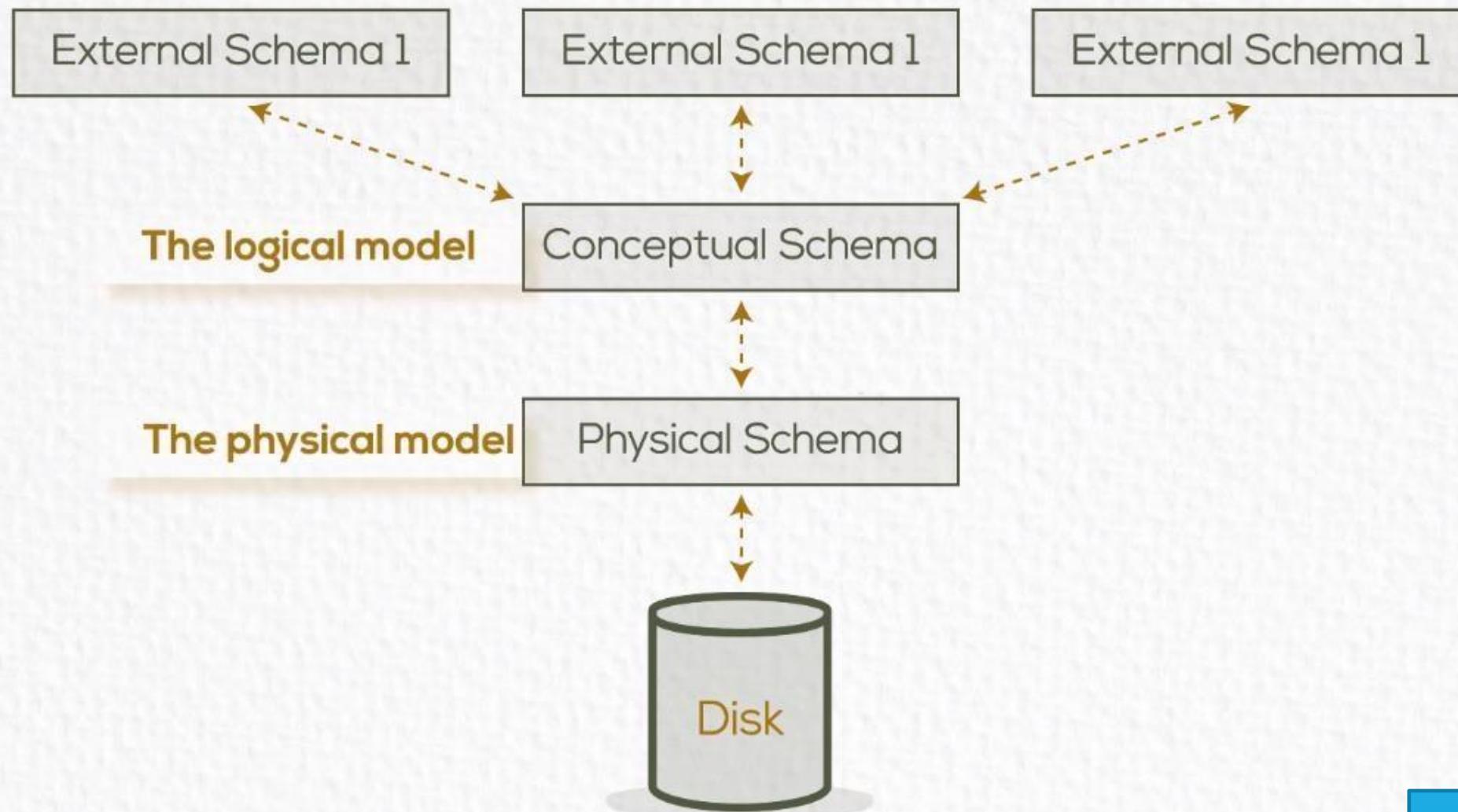












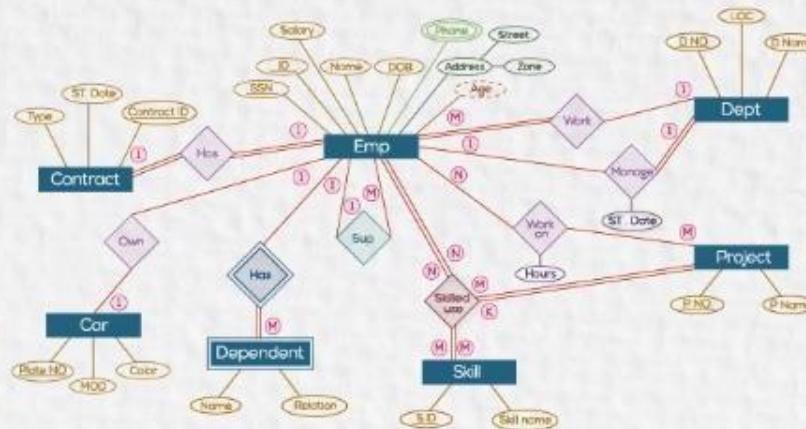
Data Models

→ The logical model

→ The physical model

Data Models

The logical model /conceptual model

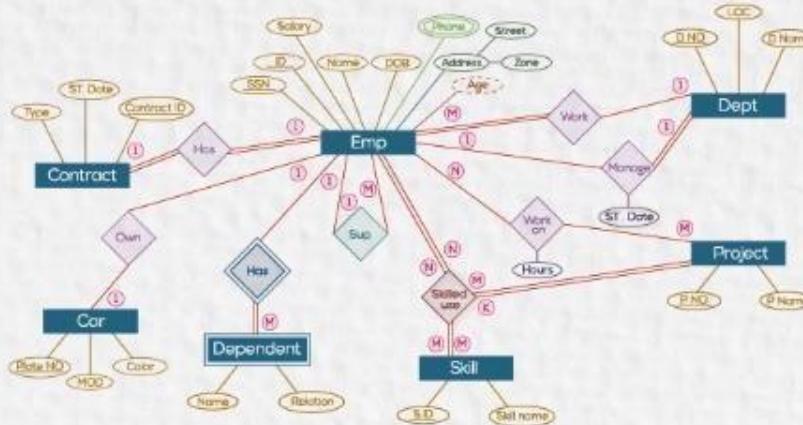


provide concepts that are close to the way many users perceive data, **entities**, **attributes** and **relationships**.
(Ex. ERD)

The physical model

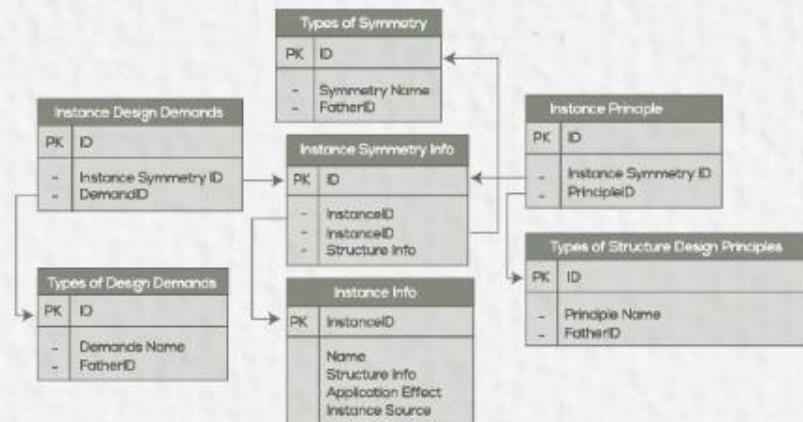
Data Models

The logical model /conceptual model



provide concepts that are close to the way many users perceive data, entities, attributes and relationships.
(Ex. ERD)

The physical model



describes how data is stored in the computer and the access path needed to access and search for data.

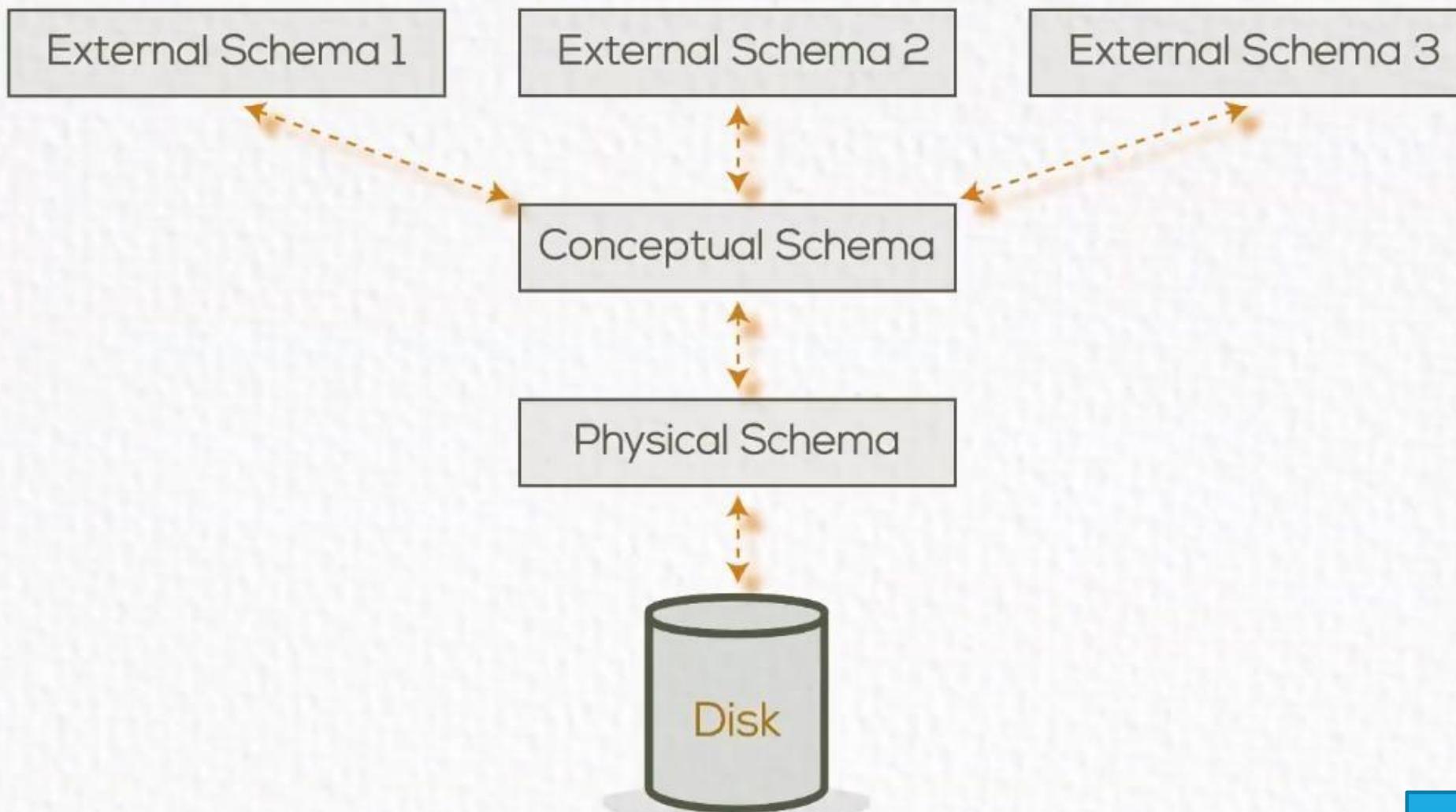


Mapping

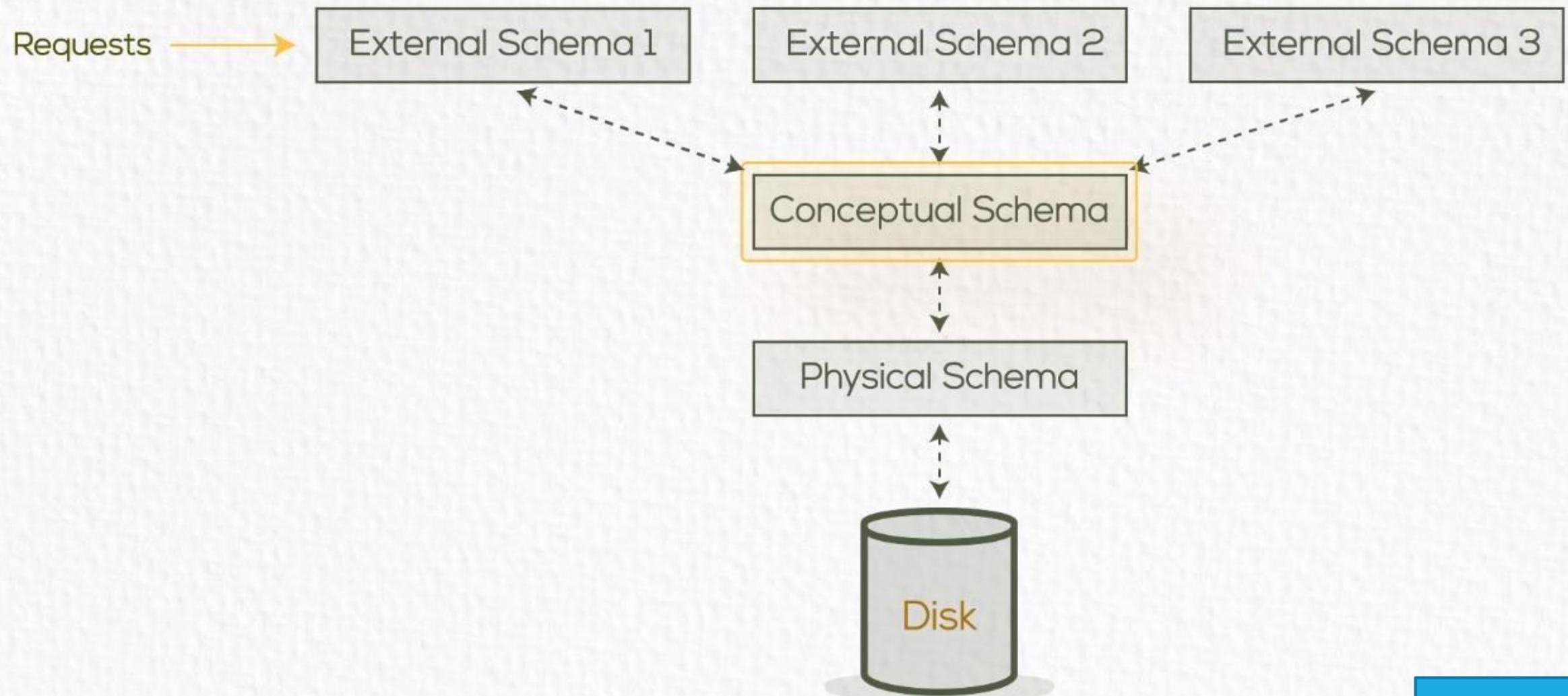
Mappings

- **Definition:** It is the **processes of transforming** requests and results between levels.

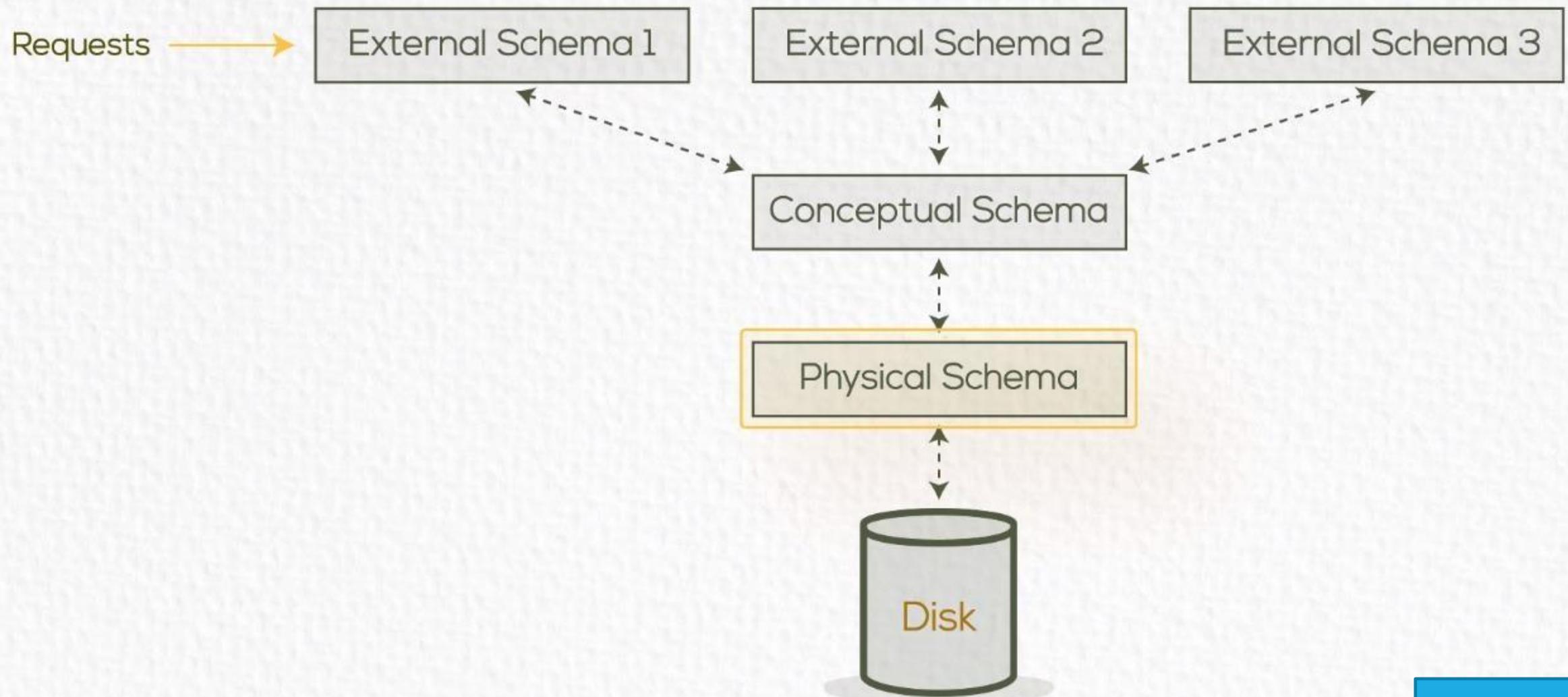
Mappings



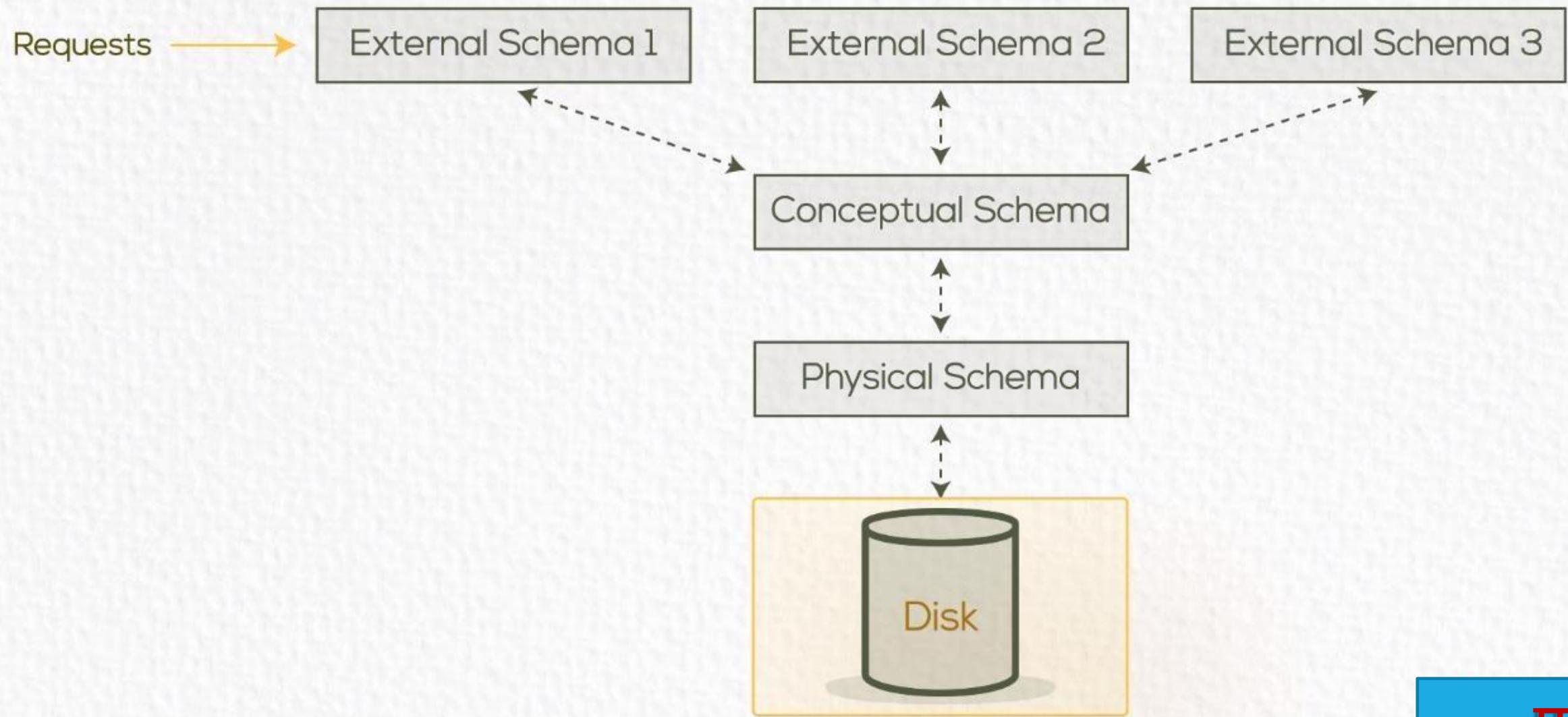
Mappings



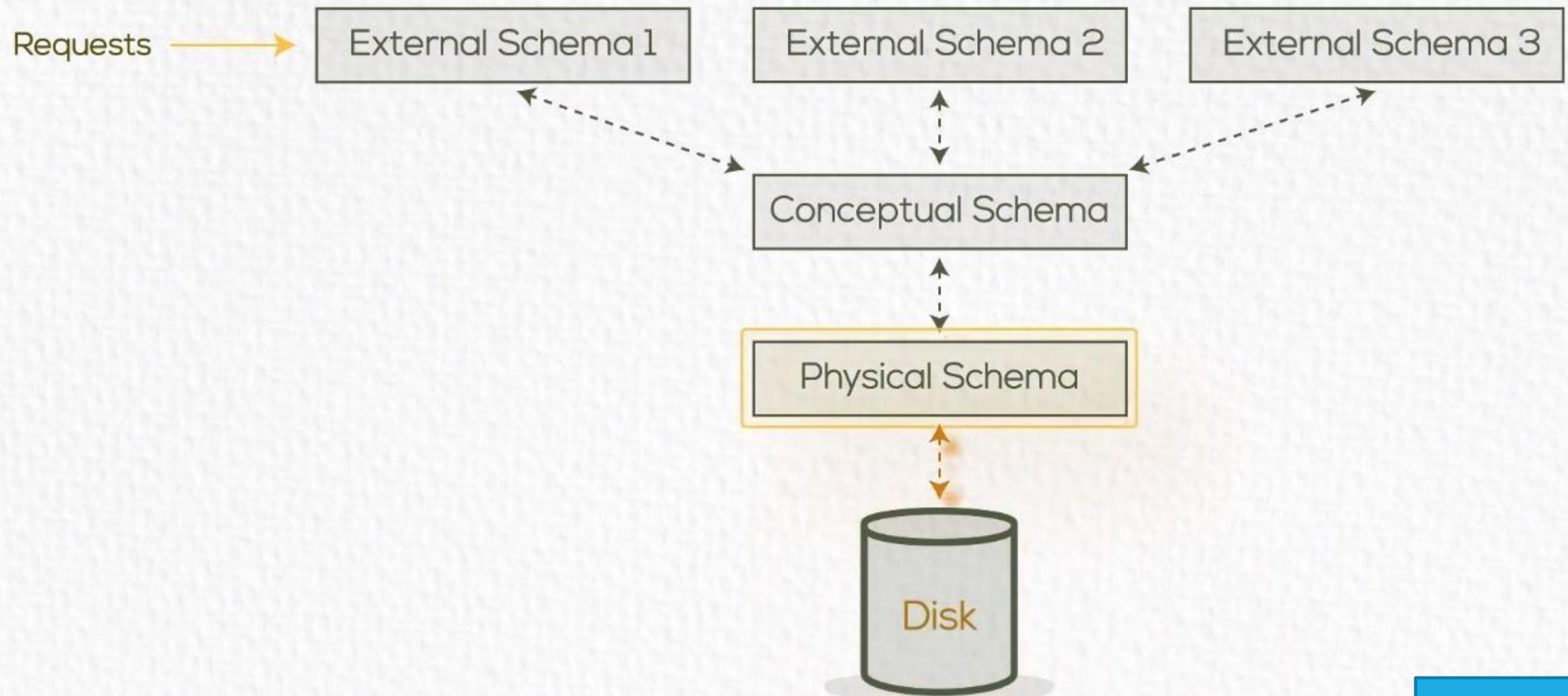
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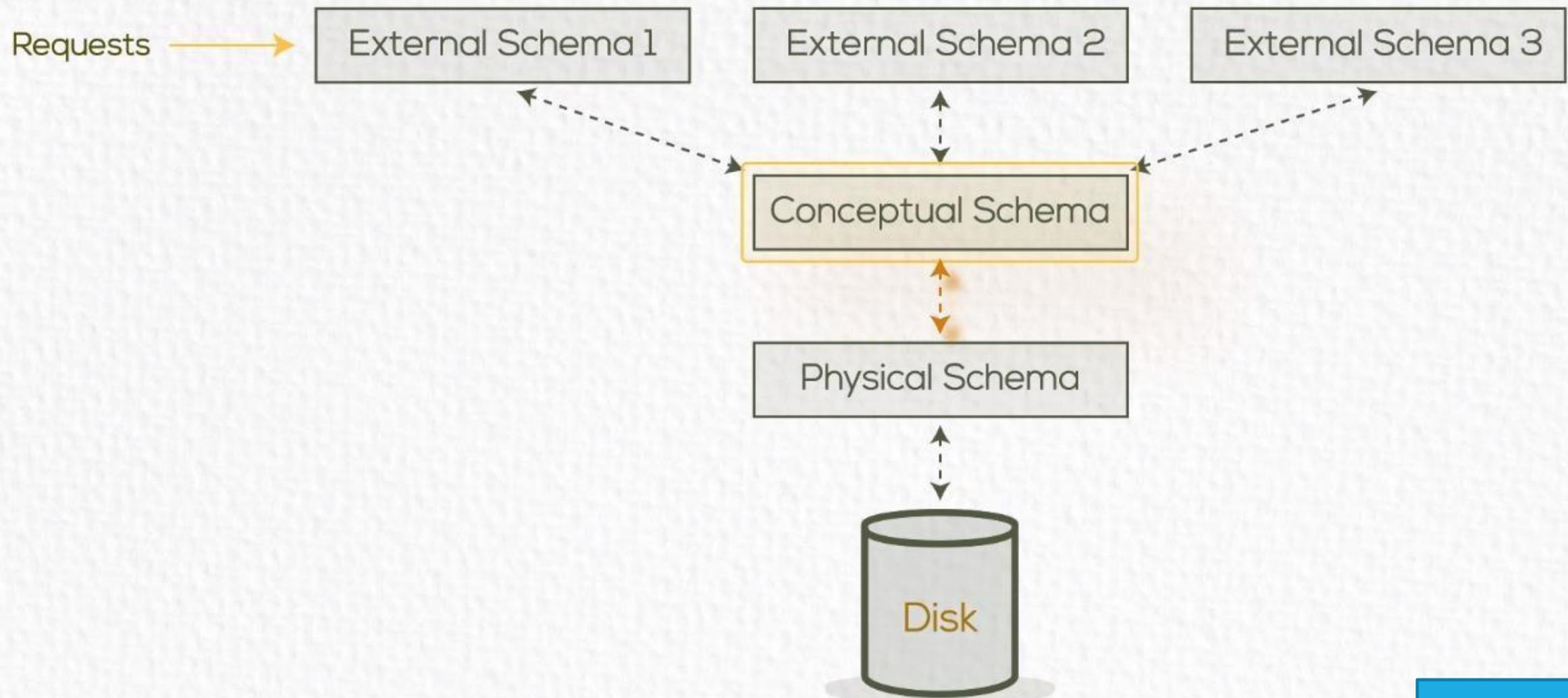
Mappings



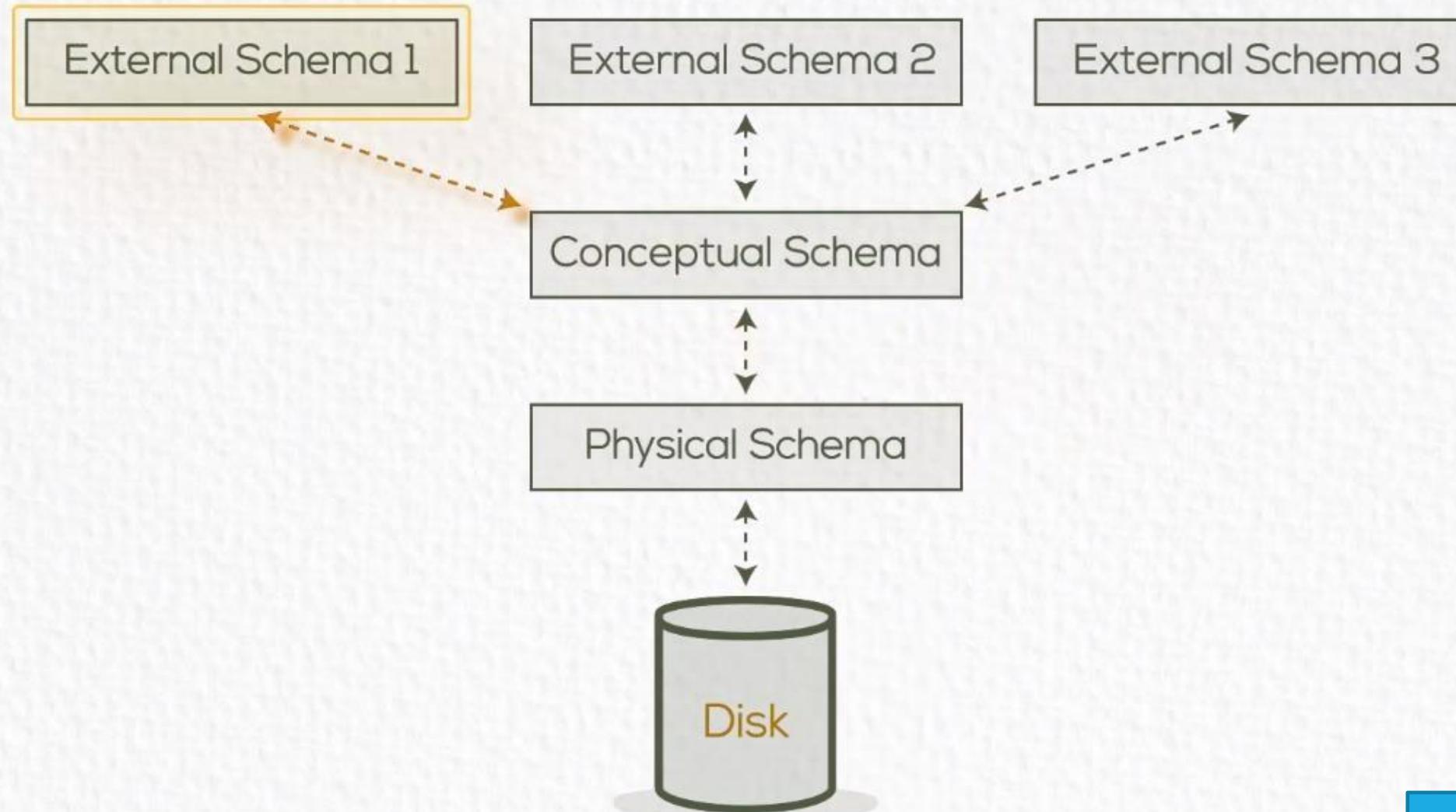
Mappings



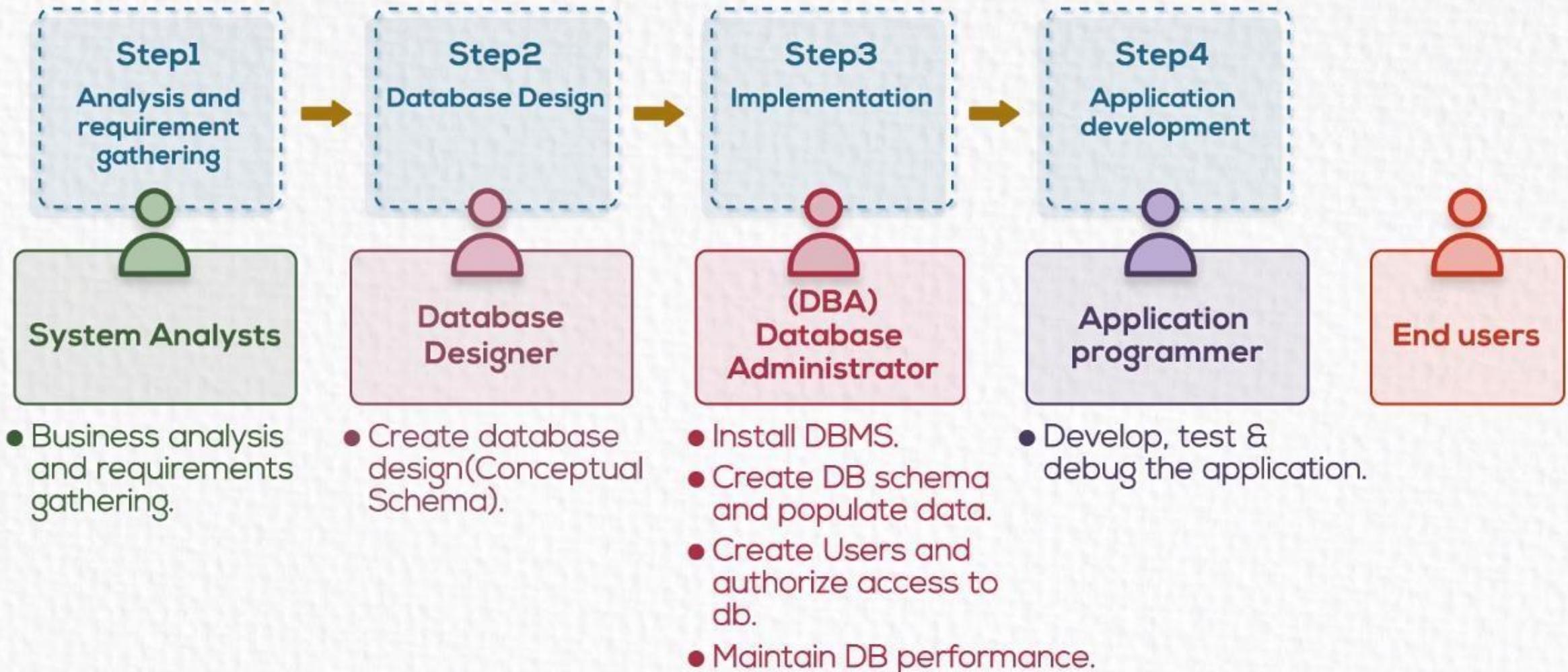
Mappings

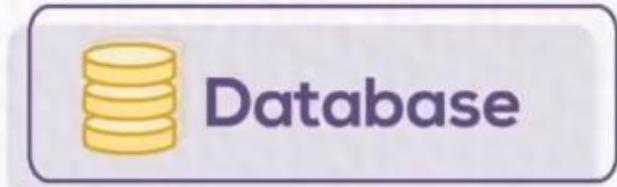


Mappings

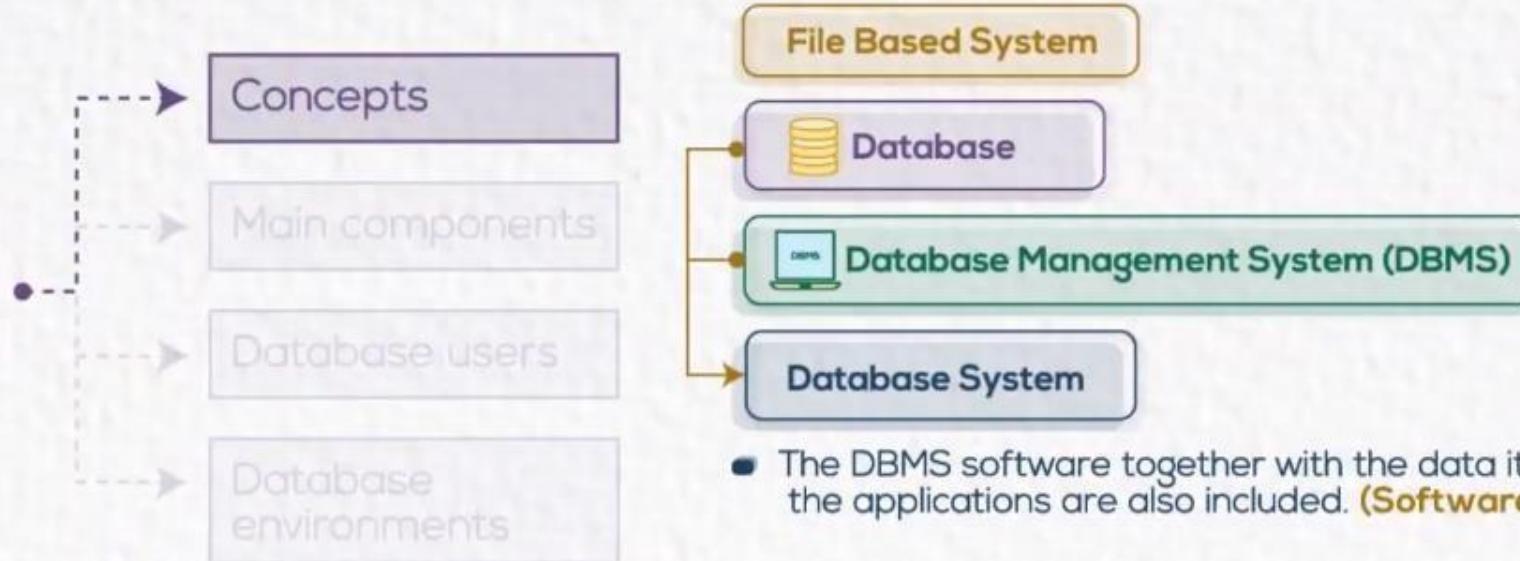


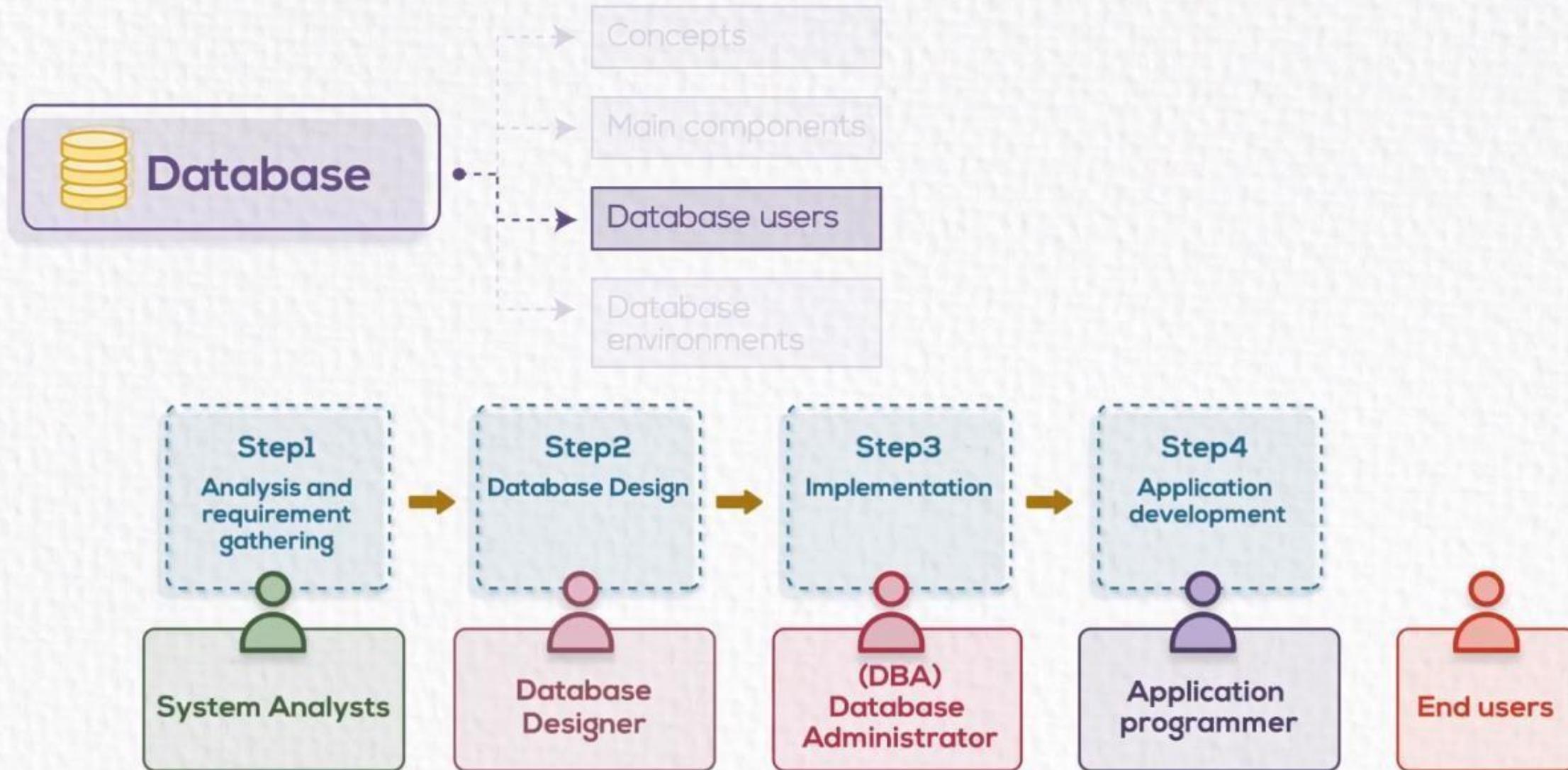
Database Users





Database





Advanced Database topics

– Advanced Database topics:

- **Data Independence:** Data Independence is defined as a property of DBMS that helps you to change the Database schema at one level of a database system without requiring to change the schema at the other levels (Physical, conceptual, external).
- **DBMS - Storage System.**
- **Intro to Database indexing.**
- **Database security.**