

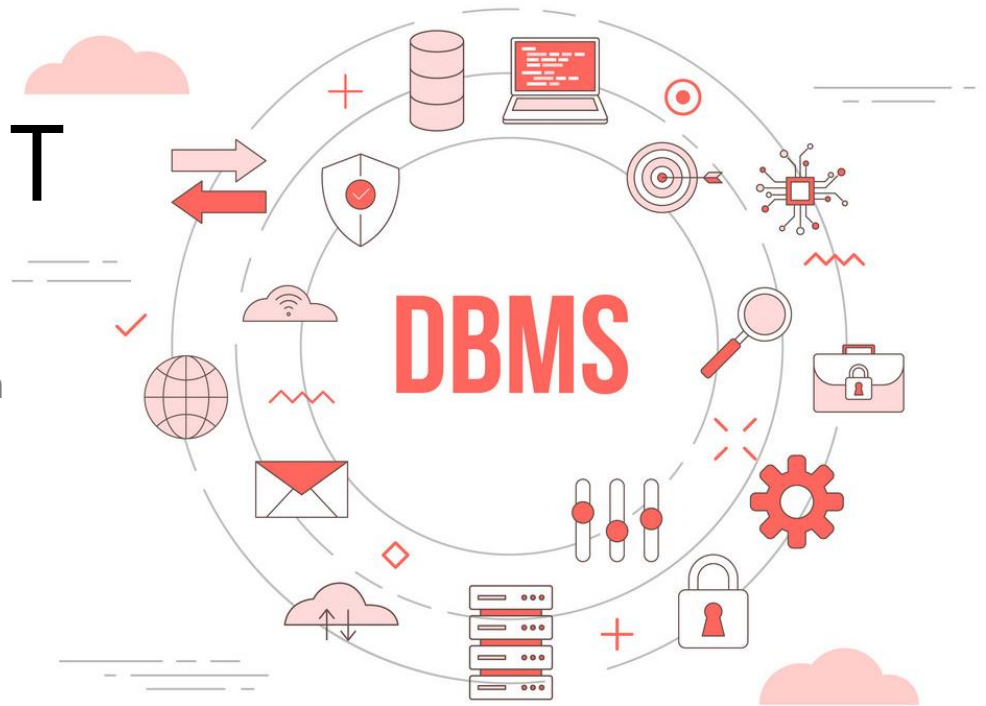
DATABASE MANAGEMENT SYSTEMS

Data Abstraction

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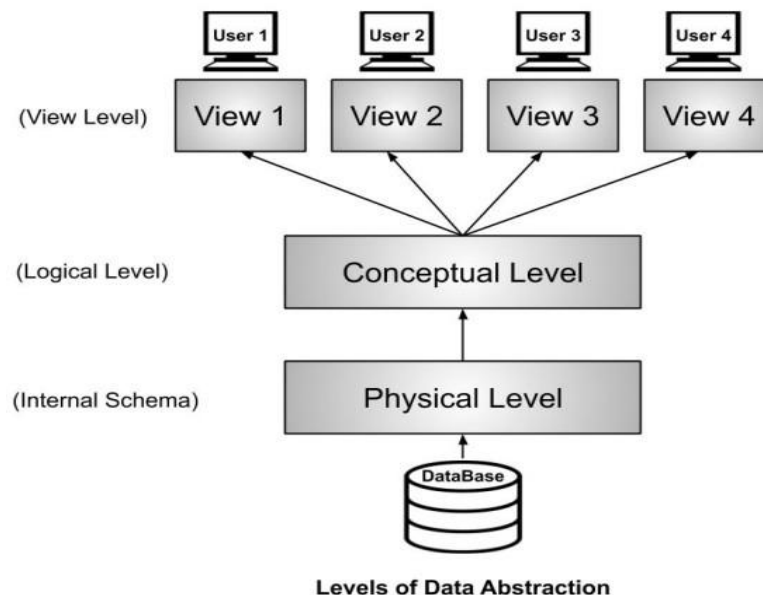
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3-Level Abstraction of Database

Data Abstraction refers to the process of hiding irrelevant details from the user.

There are three stages of data abstraction, which we split into three tiers to achieve Data Independence. Data independence implies that consumers and data should not interact directly with one another. The user should be on a separate level, and the data should be on a different level. Data Independence can be obtained in this manner.



3-Level Abstraction of Database

View Level

This is the highest level. At the view level, there are many perspectives, each of which defines just a subset of the overall data.

It also improves user engagement by giving many views or perspectives of a single database. The view level is accessible to all users. This is the simplest and most basic level.

Logical / Conceptual Level

The next higher or intermediate level is the logical level. It describes what data is kept in the database and how those data are connected to one another.

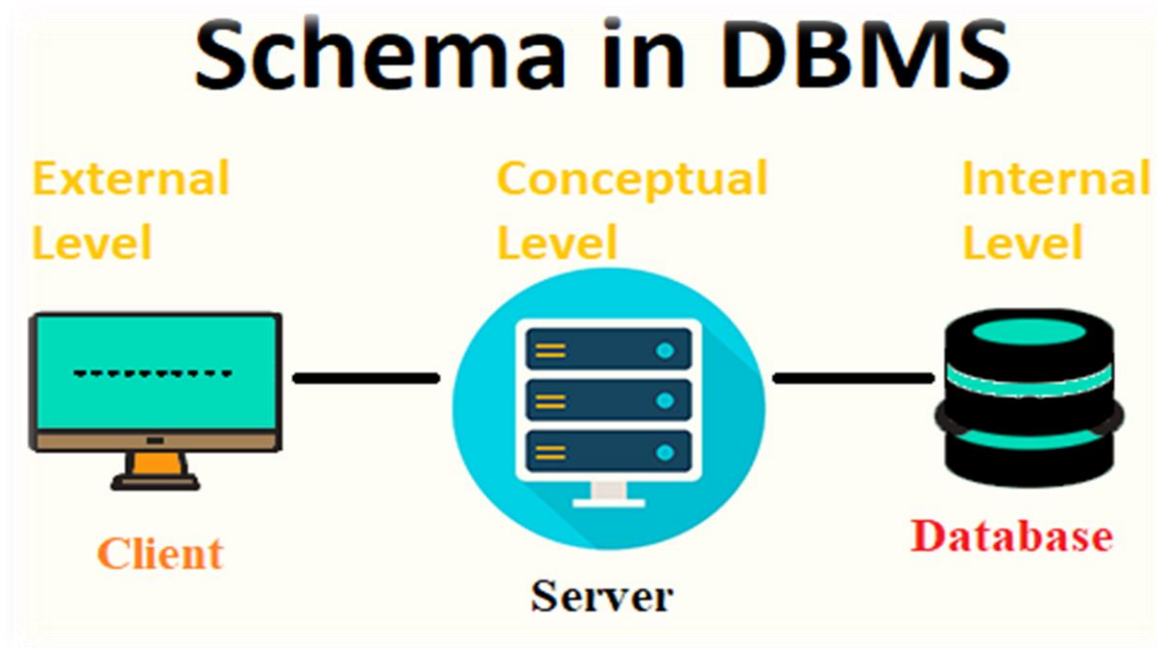
It attempts to describe the full or complete data set by defining what tables should be built and what the relationships between those tables should be. It is not as complicated as the physical level.

3-Level Abstraction of Database

Physical Level

It defines how data is stored, data structures for storing data, and database access procedures at the lowest level of abstraction for DBMSs.

Database application programmers or developers decide how to store data in the database. It is difficult to grasp.



Cont...

Advantages of Data Abstraction

- 1 It simplifies things for the users.
- 2 While retrieving data abstractions in DBMS improves system efficiency.
- 3 Users' usability is increased.
- 4 Increases the application's security by hiding implementation details from users.
- 5 Increases code duplication and reuse.

Mapping & Data Independence

What is Data Independence?

Data Independence is described as a DBMS attribute that allows you to alter the database schema at one level of a database system without changing the schema at the next higher level. Data independence allows you to maintain data distinct from any applications that use it.

Mapping refers to the process of translating requests and outcomes between tiers.

- Internal Mapping
- External Mapping

Cont...

Conceptual/Internal Mapping or Physical data independence

Physical data independence allows you to distinguish between conceptual and internal/physical levels.

It enables you to offer a logical description of the database without requiring physical structures to be specified. Physical data independence is easier to acquire than logical data independence.

External/Conceptual Mapping or Logical Data Independence

The ability to update the logical schema without changing the external schema or application software is referred to as this feature.

Any changes to the data's conceptual representation would have no effect on the user's perception of the data.

Cont...

Examples of changes under Physical Data Independence

Due to Physical independence, any of the below change will not affect the conceptual layer.

- Using a new storage device like Hard Drive or Magnetic Tapes
- Modifying the file organization technique in the Database
- Switching to different data structures.
- Changing the access method.
- Change of Location of Database from say C drive to D Drive.

Examples of changes under Logical Data Independence

Due to Logical independence, any of the below change will not affect the external layer.

- Add/Modify/Delete a new attribute, entity or relationship is possible without a rewrite of existing application programs
- Merging two records into one
- Breaking an existing record into two or more records

Cont...

Advantages of Data Independence

- 1 Assists you in improving the data's quality.
- 2 Database system upkeep has gotten more inexpensive.
- 3 Standardization and database security enhancements.
- 4 Allow developers to concentrate on the overall structure of the database rather than the inside implementation.
- 5 It enables you to enhance an undamaged or undivided condition.
- 6 Database inconsistency is greatly decreased. It is necessary to be able to easily make changes at the physical level in order to improve the system's performance.

Database Users

Different database users are:

Database Administrators (DBA)

The most significant sort of database user in DBMS is the Database Administrator (DBA). A database administrator is an individual or a group of users who establish the database schema and govern various levels of the database inside the company.

Database Designers

Database Designers are DBMS database users who are in charge of implementing the overall design of the database. They determine what sort of data must be saved, what kinds of relationships exist between database entities, what types of attributes will be used, and so forth.

Naive Users

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Database Users

Application Programmers / Back-End Developers

Application Programmers, also known as Back-End Developers, are computer professionals who are in charge of creating application programmes (C, C++, Java, PHP, Python, and so on) or the user interface so that other users may interact with the database.

Sophisticated Users

Sophisticated users are database users who understand DBMS (DDL and DML commands) and are familiar with the database. Business analysts, engineers, scientists, and system analysts are examples of sophisticated users.

Casual Users / Temporary Users

Casual users, also known as transient users, are database users in DBMS who utilise the database services on a regular or seldom basis. When these users try to access the database, they want all of the information to be in one location.

Roles of Database Administrator

Some of the primary roles are listed below.

- 1 Makes the choice about the database's content.
- 2 Create a storage structure and an access strategy.
- 3 Provides assistance to users.
- 4 The security and integrity checks are defined.
- 5 Periodic backup and recovery solutions for interpreters.
- 6 Monitoring performance and reacting to changes in needs.
- 7 DBA monitors the jobs running on the database and ensures that the performance is not degraded by very expensive tasks submitted by some user