DBMS: Architecture

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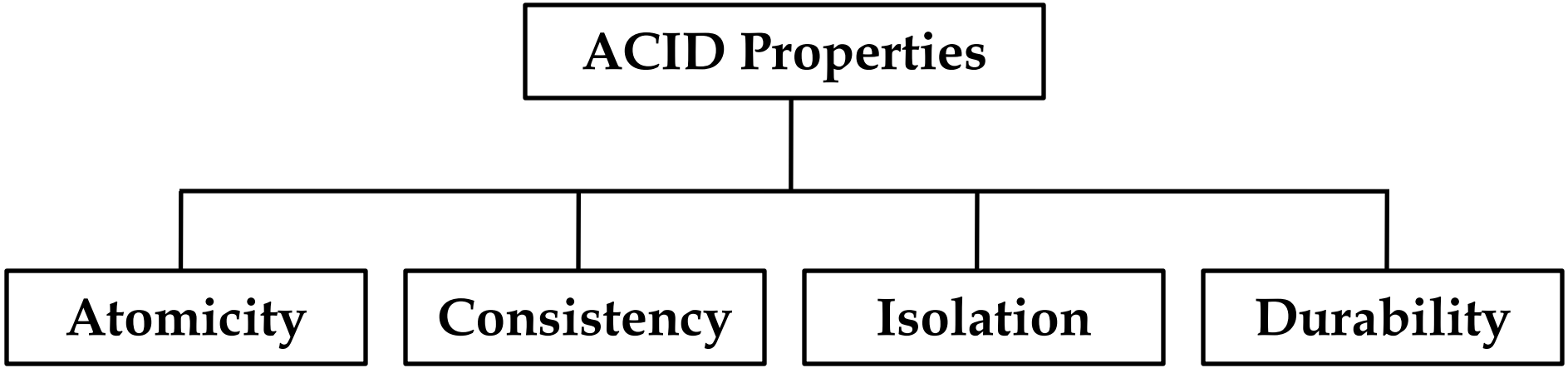
ACID Properties



Atomicity

- The term atomicity defines that the data remains atomic.
- It means if any operation is performed on the data, either it should be performed or executed completely or should not be executed at all.
- It further means that the operation should not break in between or execute partially.

Consistency

- The word consistency means that the value should remain preserved always.
- In DBMS, the integrity of the data should be maintained, which means if a change in the database is made, it should remain preserved always.

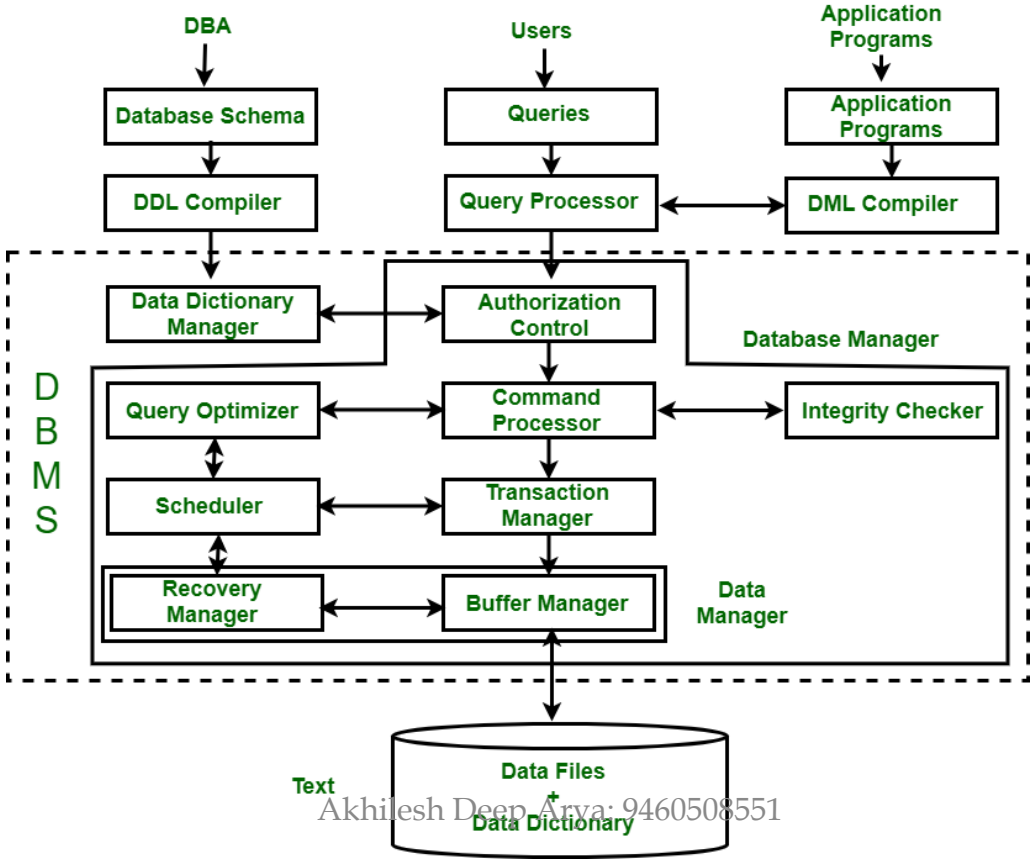
Isolation

- The term 'isolation' means separation.
- In DBMS, Isolation is the property of a database where no data should affect the other one and may occur concurrently.
- It means if two operations are being performed on two different databases, they may not affect the value of one another.

Durability

- Durability ensures the permanency of something.
- In DBMS, the term durability ensures that the data after the successful execution of the operation becomes permanent in the database.
- The durability of the data should be so perfect that even if the system fails or leads to a crash, the database still survives.
- For committing the values, the COMMIT command must be used every time we make changes.

Database Architecture



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- The database system is divided into three components:
  - Query Processor
  - Storage Manager
  - Disk Storage.

Query Processor

- User or application interact with the query processor and submit their request in the form of SQL.
- Query processor then select a plan to execute user request
- And then it interacts with the storage engine

Cont..

- There are various components of the query processor:
  - **DML Compiler:** it transform user request in low level instructions, that can be used by query evaluation engine
  - **Embedded DML Pre-compiler:** it converts DML statements embedded in an application program to normal procedure calls in host language

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- **DDL Interpreter:** it makes data dictionary, which contains meta data
- **Query evaluation engine:** it executes low level instructions generated by the DML compiler.

Storage Manager

- It provides the interface between low level data stored in the database and the application program and queries submitted to the system
- Components are:
  - **File manager:** it manages disk space allocation and the data structures used to store the data
  - **Buffer manager**: it fetches the data from disk to main memory and decided the caching startaegy suitable for the application

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- **Transaction manager:** it ensures the consistency of the database after every transaction
- **Authorization and Integrity manager:** it checks the integrity constraints on the database, also take care the authorization to the users

Disk Storage

- It contain following components:
  - **Data File:** it stores the actual data (raw)
  - **Data Dictionary:** it contains the information about the structure of any database object. It also contains information regarding the metadata.
  - **Indices:** it ensure the faster retrieval of data