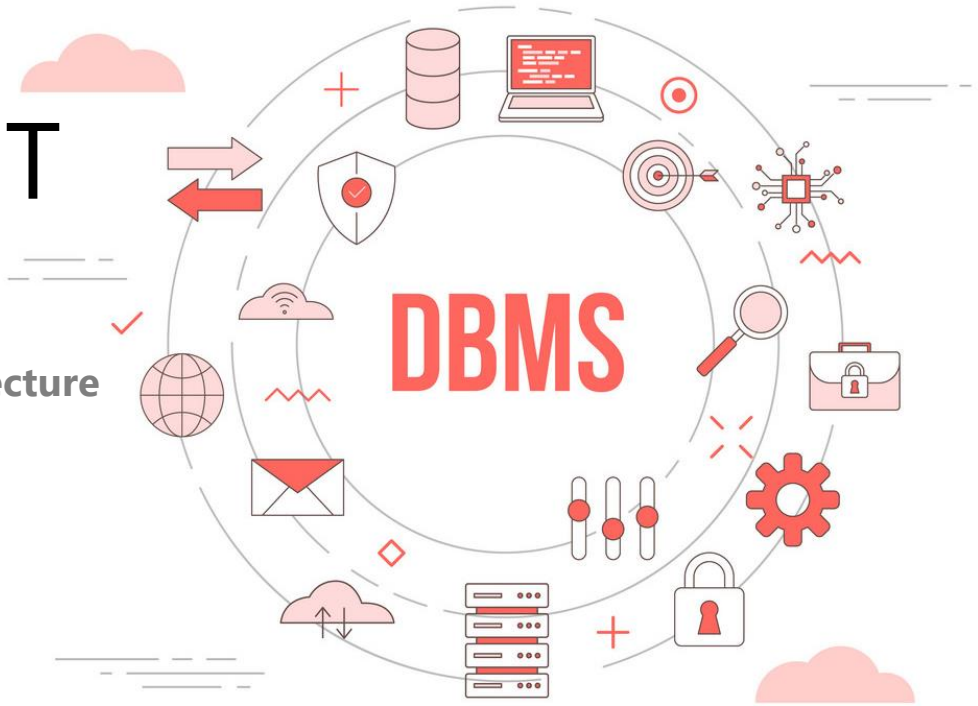
DATABASE MANAGEMENT SYSTEMS

Database Architecture



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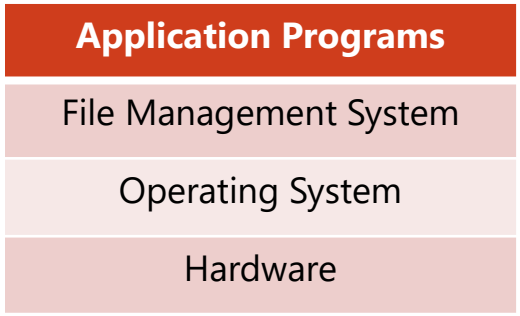
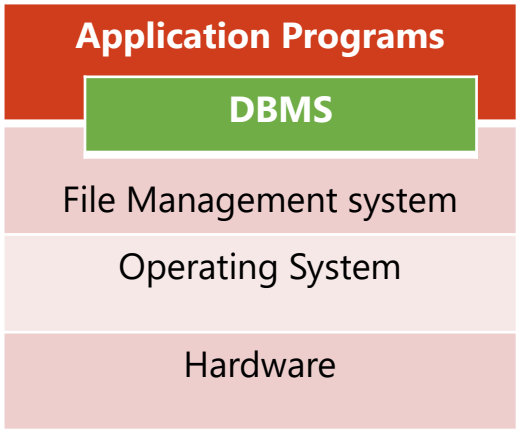
Database Architecture

How DBMS systems work?

The overall computer systems consists of 4 components. The DBMS systems functions between the Application Programs and File management systems.





Data Storage & Querying

The database system is divided into two components, i.e

1. Storage Manager
2. Query Processor

Data Storage Manager

What is Data Storage Manager?

Data Storage Manager, commonly known as "Database Control System," is a program that acts as a bridge between the data/information stored and the queries that are received.

Interactions with the file manager are handled by the storage manager. The file system offered by the operating system is used to store raw data on the disc. It converts DML sentences into Low-level instructions.

Raw data is stored on the disk using the file system provided by the operating system.

Cont…

The storage manager components include:

1. **Authorization and integrity manager**

   Checks for the fulfilment of integrity constraints and the authority of users to access data.

2. **Transaction manager**

   Ensures that the database remains in a uniform state despite system failures where the ongoing transaction executions proceed without conflict.

3. **File manager**

   Manages the allocation of space on disk storage and therefore the data structures used to represent information on the disk.

4. **Buffer manager**

   Accountable for fetching data from disk storage into main memory, and deciding what data to cache in main memory.

Cont…

5 **Data Files**

Stores the database itself.

6 **Data Dictionary**

Stores metadata about the structure of the database, in particular the schema of the database.

7 **Indices**

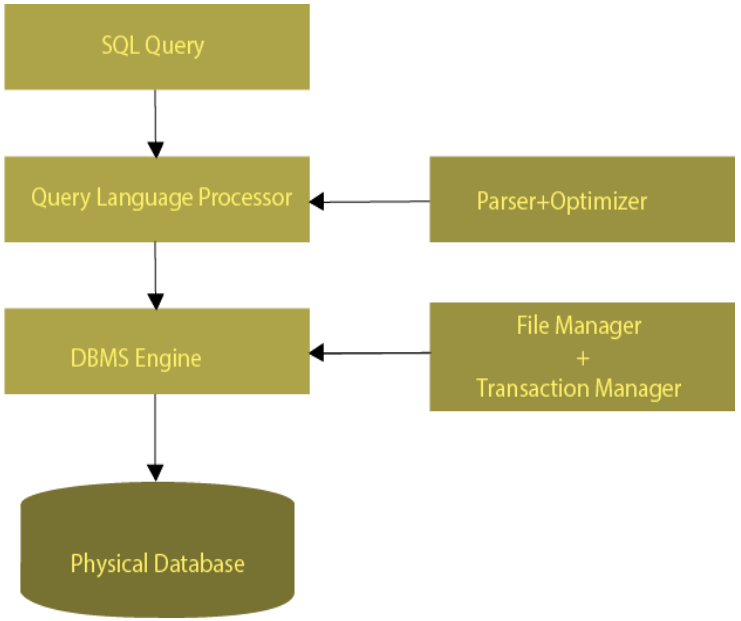
Enables easy access to data elements.
A database index, like the index in a textbook, gives links to data objects that have a certain value. For instance, we might use an index to locate the teacher record with a specific ID or all instructor records with a specific name.

Query Processor

What is Query Processor?

The query processor is a data server component that handles SQL requests.

SQL queries can either visit a single database or file system or refer to several databases or file systems. Accesses and combines data from many data sources and updates a single data source.



Query Processor

The Query Processor contains 3 components:

1. **DDL Interpreter**

   This interprets the DDL statements and records into the Data Dictionary.

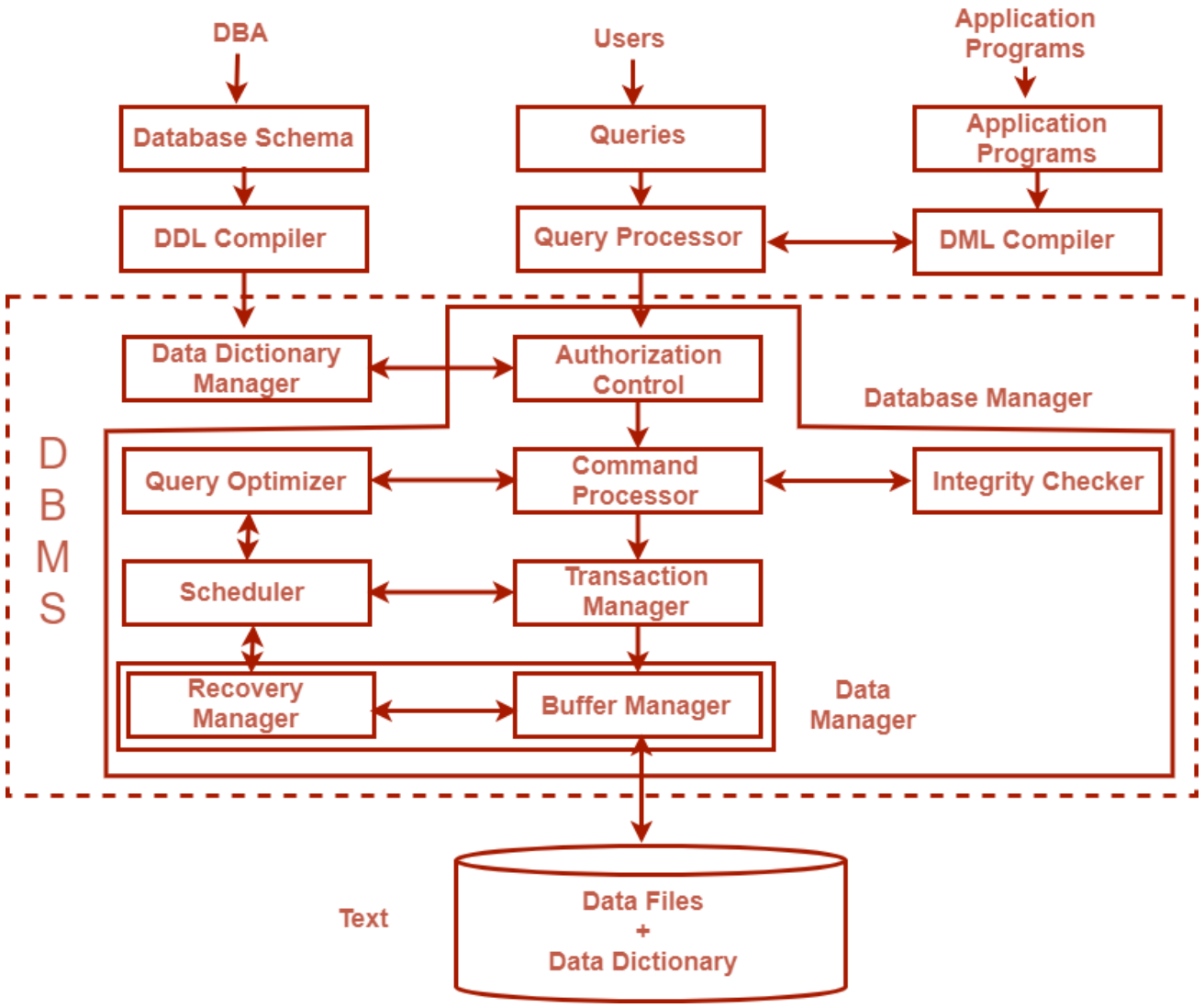
2. **DDL Compiler**

   It translates the DML statements into query language consisting of low-level instructions that the query Engine understands.

3. **Query Evaluation Engine**

   Executes low-level instructions generated by the DML compiler

Overall Database Architecture



Application Architecture

DBMS architecture is critical in the design, development, implementation, and maintenance of the company's database management system.

The appropriate selection of database architecture will initially address many design challenges while also facilitating speedy and safe data access.

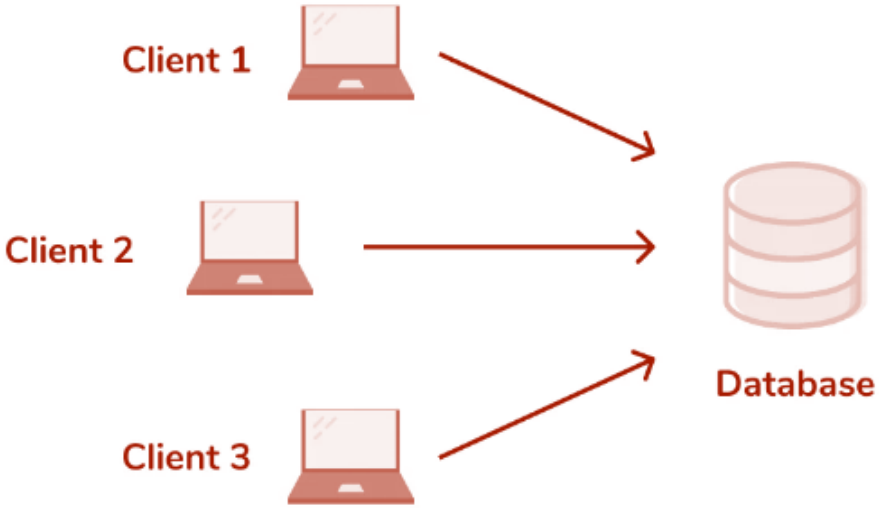
Any database management system employs one of the two designs listed below.

- 2 tier architecture (two-level)
- 3 tier architecture (three-level)

Application Architecture

2-Tier Architecture

1. Client-side application:
2. Server side Application



The two-tier architecture is similar to the basic Foundation model i.e client-server model

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Client-side application:

Generally, user interfaces and application programs execute on the client side. It is often a client-side presentation layer (PC, Mobile, Tablet, etc).

In order to establish communication between the databases, this client application sends a request to the server-side up an application.

Server side Application:

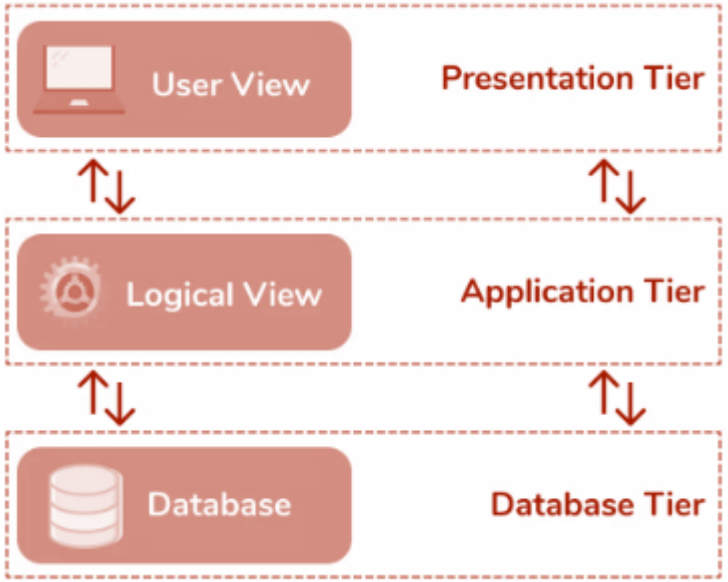
The server is in charge of query processing and transaction administration. In this case, the client connects directly with the database base on the server's side, and the server responds to the client's request.

A server simply stores server-side represented data. APIs like as ODBC and JDBC are commonly used for this interaction, i.e. for sending requests from the client-side application.

Application Architecture

3-Tier Architecture

1. Presentation tier
2. Application tier
3. Database tier



This is the most widely used architecture these days and all the tiers are separated from one another.

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Presentation Tier

This is often referred to as the user tier. The user may view all of the database results here, like if the a user is accessing his/her profile page:

All of the information was transferred from the database to the application tier, which then passed it to the presentation tier, which displayed it in a view for the user to comprehend and read. HTML/CSS are also utilised to change how this data appears to the end user.

Application: Tier

This serves as a bridge between the database tier and the user. This is the code level software that may access the database for various operations.

For example, suppose you wish to build code to update an email ID in a database. In this situation, the user is not communicating directly with the database. However, it is connecting with the application tier, which performs code-level processing before dealing with the database.

Database Tier

This tier contains raw data as well as its DBMS system language and queries that allow diverse operations on the database.

For example, all of the KIITSAP website's user database is stored on this tier.

Discussions

Disadvantages of DATABASE Processing ?