

DATABASE MANAGEMENT SYSTEM (DBMS)

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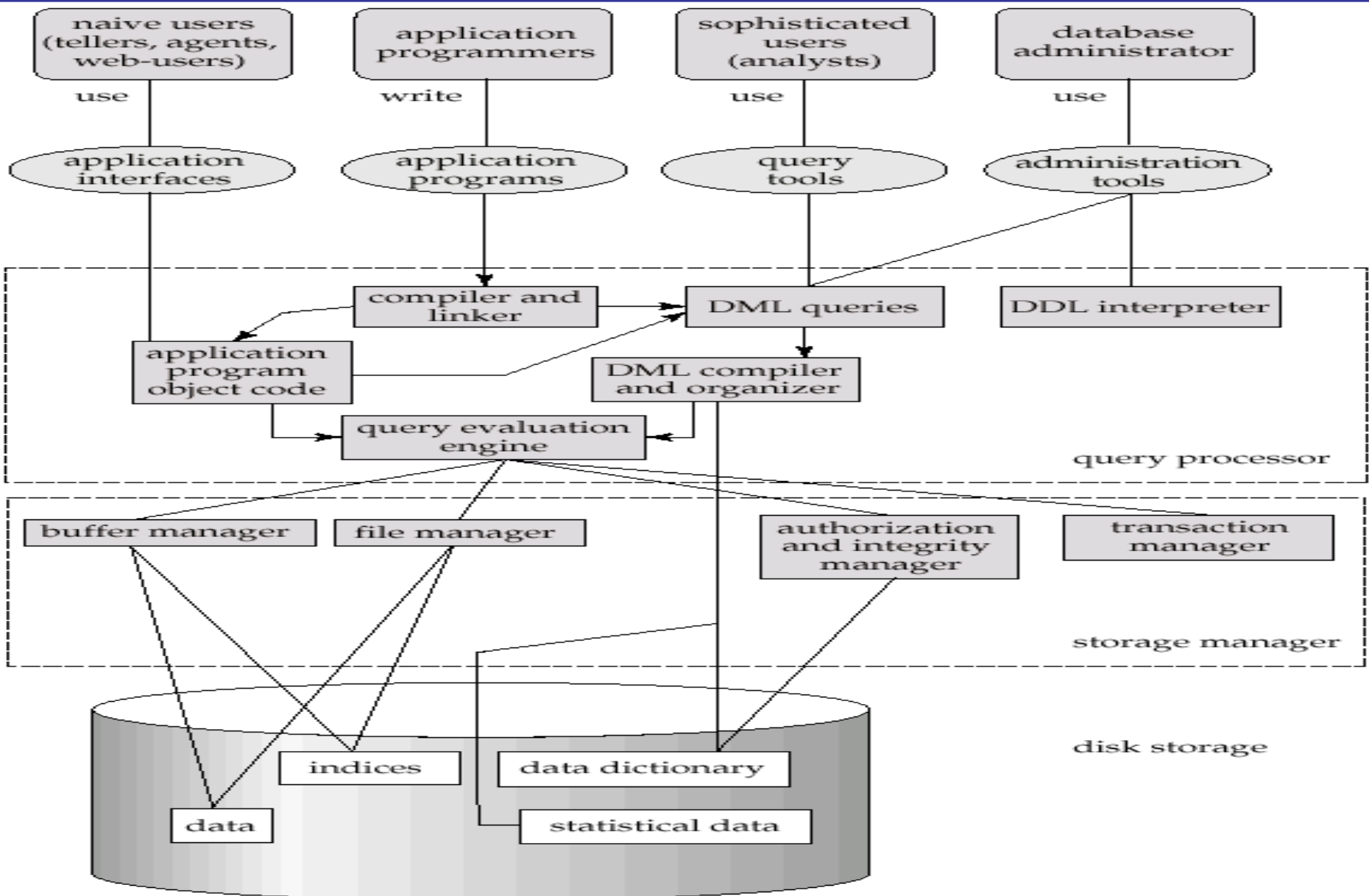
Database system concepts and architecture

Database Architecture

The architecture of a database systems is greatly influenced by the underlying computer system on which the database is running:

- Centralized
- Client-server
- Parallel (multi-processor)
- Distributed

Database System Structure



Database System Structure

- DBMS systems are complicated or complex or may be some times sophisticated. A DBMS has several software **components** Called **MODULES**.
- Each of which is assigned a **specific function(components)**–
- **QUERY PROCESSOR:** A *query processor* is one of the major components of a relational database or an electronic database in which data is stored in tables of rows and columns. It complements the storage engine, which writes and reads data to and from storage media.
- It **transforms queries into a series of low-level instruction directed to database manager**. It parses, analyses and converts a query by creating **database access code**.
- The Query Processor is a **Structured Query Language (SQL) parser, optimizer, and query execution engine**. The Query Processor accepts and executes SQL commands according to a chosen plan and interacts with the Enterprise Database Server storage engine to return the expected results.

Component of DBMS

- **FILE MANAGER:** A file manager is a software program that helps a user manage all the files on their computer. For example, file managers allows the user to view, edit, copy, and delete the files on their computer storage devices. It manages the allocation of storage space on disk.
- It maintains the list of structure or indexes if hashed files are used then hashing function is used to generate record addresses. Then it passes control to access method which either allow the data to be read or write data to the buffer.
- **DML PRE-PROCESSOR:** Data Manipulation Language pre-processor is a component of DBMS that converts embedded DML commands to the application program in the form of the functions that are called in the host language.
- It converts data manipulation language statements into standard function call.
- It must interact with the query processor to generate the appropriate code.

Component of DBMS

- **DDL-COMPILER:** Data Description Language compiler processes schema definitions specified in the DDL. It includes metadata information such as the name of the files, data items and storage details of each file.
- It converts data definition language statements into a set of tables containing Meta data.
- Data dictionary contains name and size of file, data type, storage details, mapping information among schemas and constraints.
- **DATA DICTIONARY MANAGER:** It is also known as *System Catalogue*. It is accessed by most of the DBMS components. It is so important part of the DBMS. It accesses, manages and maintains the data dictionary.
- Data Dictionary, which stores metadata about the database. in particular the schema of the database , names of the tables, names of attributes of each table, length of attributes, and number of rows in each table.

Component of DBMS

- Detailed information on physical database design such as storage structure, access paths, files and record sizes.
- Usage statistics such as frequency of query and transactions.
- Data dictionary is used to actually control the data integrity, database operation and accuracy.
- **DATABASE MANAGER:** It controls data dictionary and access of the database.
- It is an interface between users and queries. Database manager accepts queries and examines the external and conceptual schemas to determine for conceptual records are required to satisfy the generated request. Database manager then places a call to the file manager to perform the request.
- Some components of database manager are as follows-
- *AUTHORIZATION CONTROL:* It checks for user have sufficient authorization to access the system.

Component of DBMS

- *COMMAND PROCESSOR*: After checking authority then it is to carry out the operation then **control is passed to command processor**.
- *QUERY OPTIMIZER*: It **determines optimal strategy for query execution**.
- *TRANSACTION MANAGER*: It performs the **required processing of operations then it coordinates the transaction of the system**.
- *SCHEDULER*: It **schedules concurrent operation or transaction of the system**.

- **RECOVERY MANAGER**: Database in consistent state so that **database can be restored**. Recovery Manager (RMAN) is an Oracle utility that can back up, restore, and recover database files. The product is a feature of the Oracle database server and does not require separate installation.
- **Recovery Manager is a client/server application** that uses database server sessions to perform backup and recovery.

Component of DBMS

- **BUFFER MANAGER:**
- Data between main and secondary memory for transferring of the data.
- It is also called *Cache Manager*.
- The buffer manager is a software module of DBMS whose responsibility is to serve to all the data requests and take decision about choosing a buffer and to manage page replacement. The buffer manager must ensure that the number of buffers fits in the main memory.

Centralized DBMS Architecture

Centralized DBMS Architectures

- Centralized DBMS:
 - Combines everything into single system including-DBMS software, hardware, application programs, and user interface processing software.
 - User can still connect through a remote terminal – however, all processing is done at centralized site.

A Physical Centralized Architecture

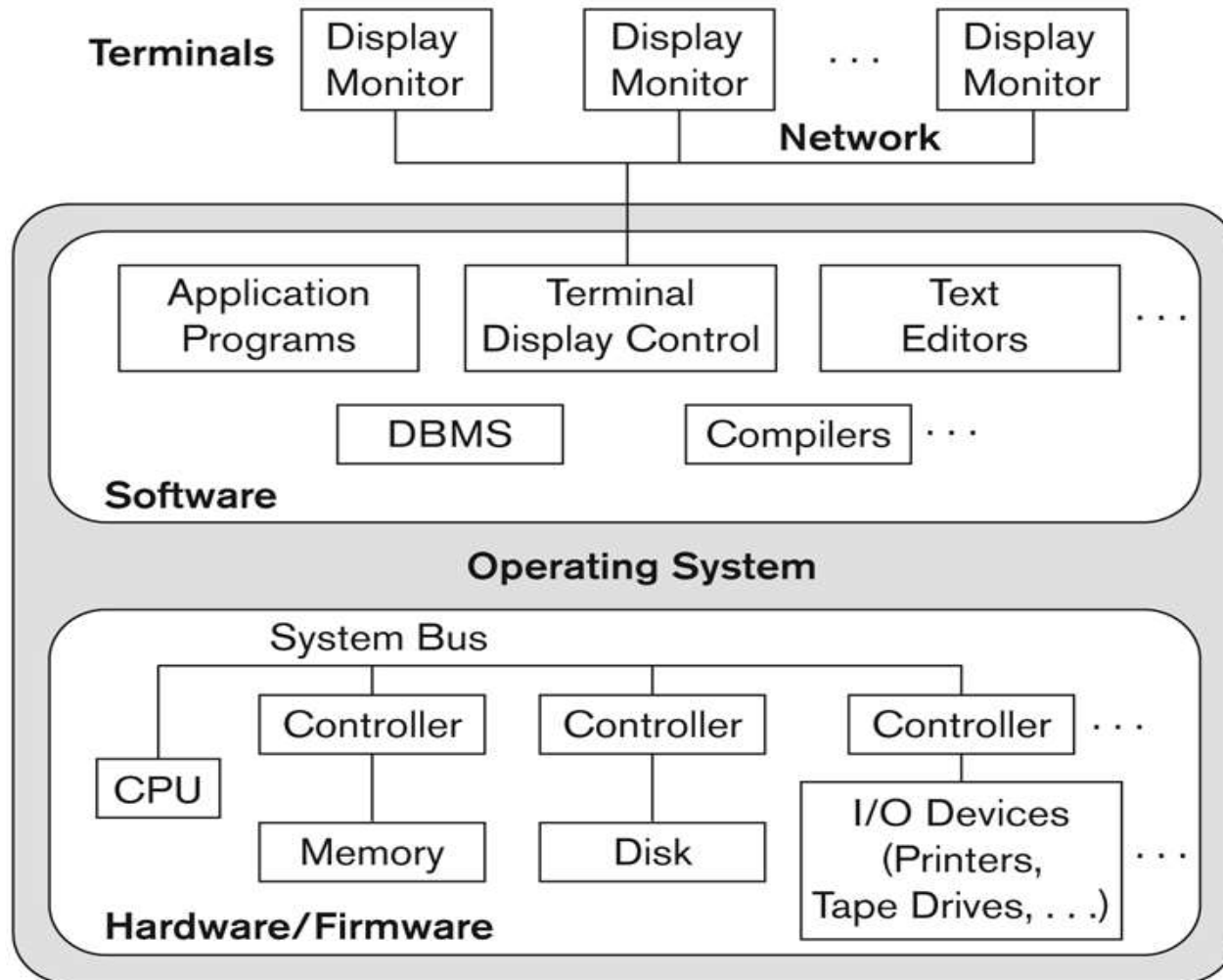


Figure 2.4
A physical centralized architecture.