

Chapter 1.2

2 distinct sources of commands

1. Conventional users
and application programs that ask for data or modify data.

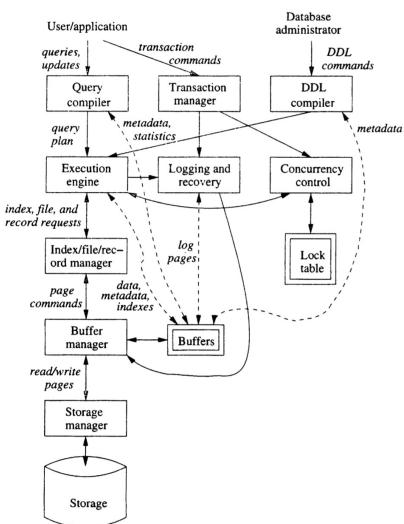
2. A database admin
a person or persons responsible for the structure or schema of the database.

1.2.1 DDL Commands

The schema-altering DDL commands are parsed by a DDL processor and passed to the execution engine, which then goes through the index / file / record manager to alter the **metadata**, that is, the schema information for the database.

1.2.2 Query Processing

A user or application initiates some action, this command does **NOT** affect the schema of the database, but may affect the contents of it.



It can also extract data from the database

Answering the Query

- Query is parsed and optimized by the **query compiler**.
- This results in a **query plan**, or sequence of

actions the DBMS will perform to answer the query.

- The query plan is passed to the **execution engine**.
 - The execution engine then issues a sequence of requests for small pieces of data.
- These requests for data are then passed to the **buffer manager**.
 - The buffer manager's task is to bring appropriate

portions of data from secondary storage (disk), to main-memory buffers.

Transaction Processing

- **Transactions** - units that must be executed atomically and in isolation from one another.
 - The execution of transactions must be **durable** meaning that the effect of any completed transaction must be preserved even if the system fails in some way

right after completion of the transaction.

Transaction Processor

1. A concurrency-control manager or scheduler, responsible for assuring atomicity and isolation of transactions and,

2. A logging and recovery manager, responsible for the durability of transactions.

1.2.3 Storage & Buffer Management

The data of a database normally resides in secondary storage. However, to perform any useful operation on data, that data must be in main memory. It is the job of the **storage manager** to control the placement of data on disk and its movement between disk and main memory.

The storage manager keeps track of the location of files on the disk and obtains the block or

blocks containing a file
on request from the buffer
manager.

The **buffer manager** is
responsible for partitioning
the available memory into
buffers, which are page
sized-regions into which
disk blocks can be
transferred.

All DBMS components that
need information from the
disk will interact with the
buffer and the buffer
manager.

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The kinds of information that various components may need include :

1. Data : the contents of the database itself.
2. Metadata : the database schema that describes the structure of , and constraint on , the database.
3. Log Records : information about recent changes to the database ; these support durability of the database.

4. Statistics : information gathered and stored by the DBMS about data properties such as the sizes of, and values in, various relations or other components of the database.

5. Indexes : data structures that support efficient access to the data.

1.2.4 Transaction Processing

It is normal to group one or more database operations into a transaction.

1.3 Part I: Relational Database Model

Functional Dependencies -
a formal way of stating
that one kind of data is
uniquely determined by
another.

Normalization - the process
whereby functional dependencies
and other formal dependencies

are used to improve the design of a relational database.

Questions :

- What is a relational data model ?

A relational data model is an approach to managing data using a structure and language.

Represents the data as a collection of relations

- What is a semistructured model ?

A database model where there is no separation between the data and the schema, and the amount of structure used depends on the purpose .

- What are the attributes, schemas, tuples, domains, relations, key (s) of relations.

Domain - Every attribute has a pre-defined value

Scope.

Key - Each row has one or more attributes, these are the key.

Schema - Describes the relation name (table name), attributes, and their names.

Tuples - A single row of a table, which contains a single record for that relation.

- What constitutes a

DBMS ?