DBMS

CSC365
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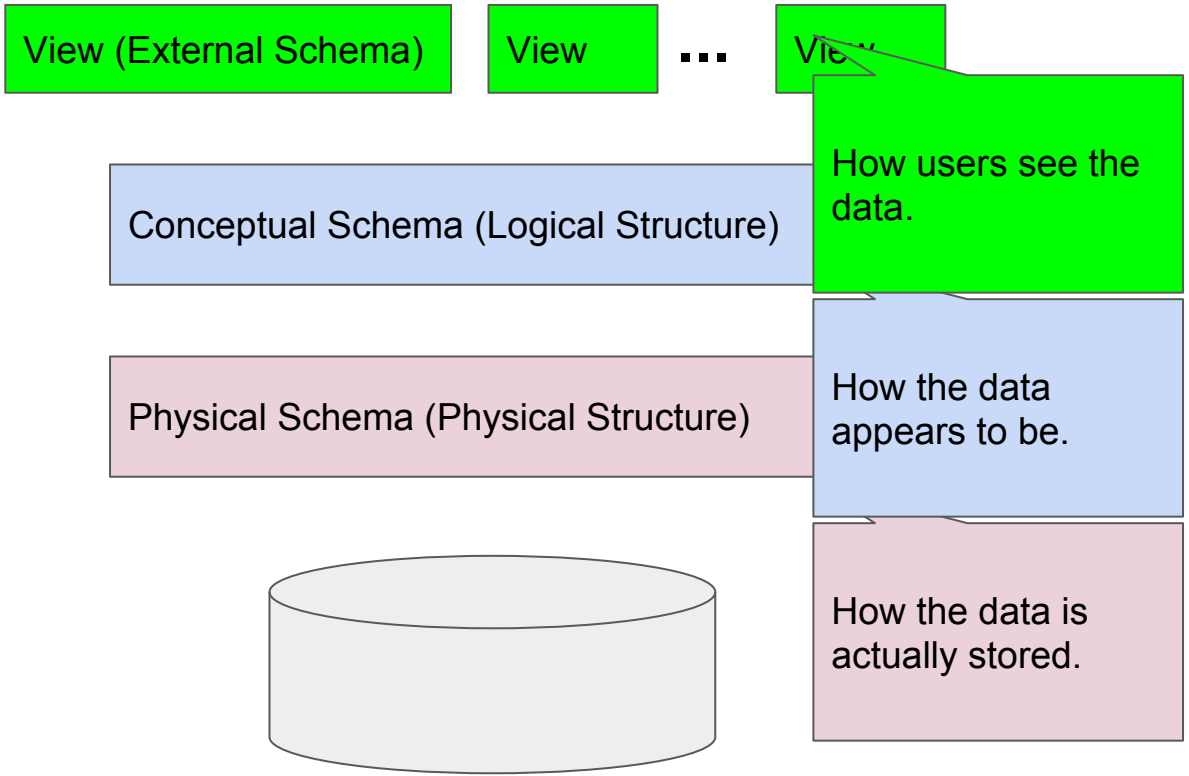
Two distinct sources of commands to DBMS

- Conventional Users
  - Somebody like you
    - who knows the commands
    - Application engineers
  - Application
    - GUI tool
    - Database Applications such as CRM, ERP, etc.
- DBA - Database Administrator
  - Build databases
  - Specify Schemas
  - Create users
  - Grant / revoke privileges

Levels of Abstraction

- Schema
  - defines the structure of data.
- Schema are defined using Data Definition Language (DDL).
- Data is modified using Data Manipulation Language (DML).
- Data is queried using Data Query Language (DQL).



Data Independence

- The levels of abstraction provides data independence
  - How data is structured and stored is transparent to applications
  - Logical data independence
    - Protection from changes in logical structure of data.
  - Physical data independence
    - Protection from changes in physical structure of data.

Data Definition Language (DDL)

- Name
- Fields
- Type
- Keys
- Constraints
- Index

```
CREATE TABLE IF NOT EXISTS Person (
  pid    INTEGER AUTO_INCREMENT,   -- Person id
  last   VARCHAR(50) NOT NULL,     -- last name
  middle VARCHAR(50),              -- middle name
  first  VARCHAR(50) NOT NULL,     -- first name
  image VARCHAR(256),      -- path to image (if exists)

  PRIMARY KEY (pid)
)
```

DML & DQL

- Manipulate
  - Create (Insert), Update, Delete
- Query
  - Read (Select)

```
INSERT INTO Person (first, last) VALUES ('Jon', 'Snow');

UPDATE Person SET image='jon_snow.jpeg' where pid=145802;

SELECT * FROM Person WHERE first='Jon' and last='Snow';

DELETE FROM Person WHERE pid=145802;
```

Database Design Flow

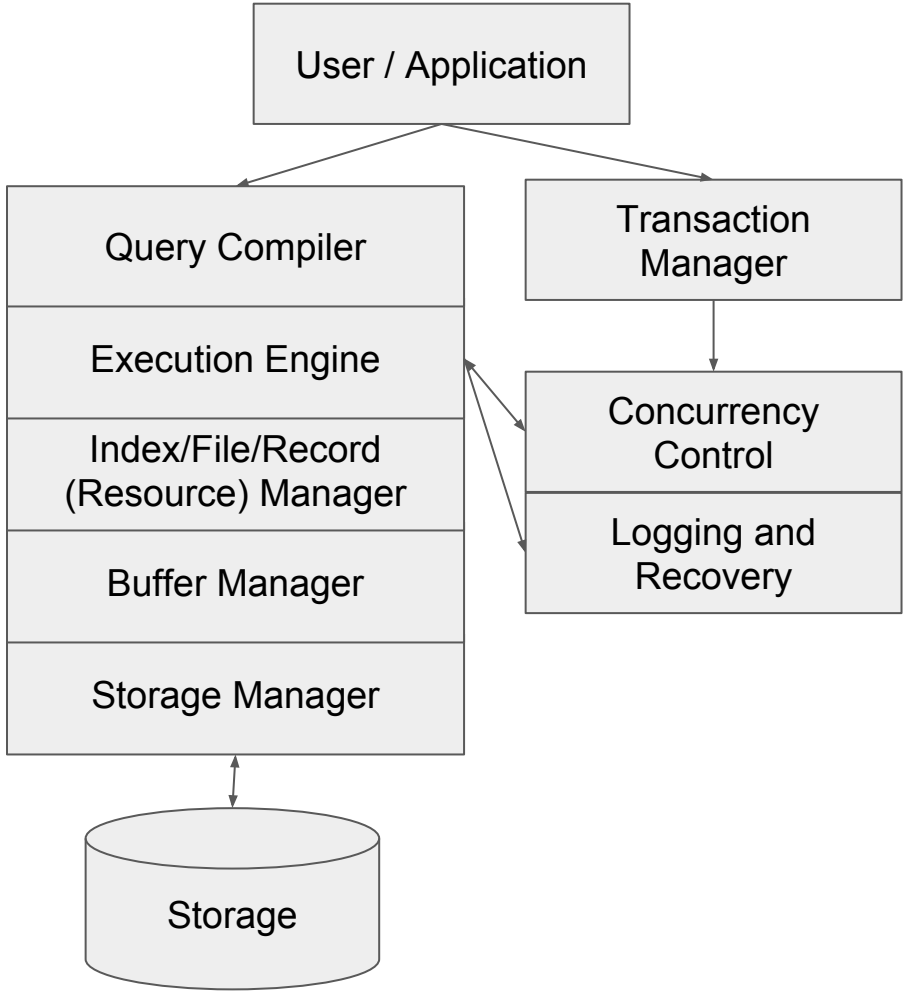
1. Requirements Analysis
2. Conceptual Design
3. Development of schema
4. Schema refinement
5. Physical consideration
    a. size
    b. type of devices
    c. location
6. Security

Transaction Processing

- Transaction
  - Collection / sequence of operations
  - Single logical function
  - ACID properties
    - A: Atomicity - all or nothing
    - C: Consistency - preserving constraints / integrity
    - I: Isolation - assures that each transaction appears to be executed in isolation from others
    - D: Durability - preservation of the result of a completed transaction

Structure of DBMS

- A typical DBMS has a layered architecture.
- This is one of several possible architectures; each system has its own variations.



Summary

- Benefits of using DBMS
  - Management of large amount of data
  - Concurrent access
  - Integrity / Consistency
  - Recovery from system crashes
  - Security
  - Data independence
  - Quick Application Development
  - It is Free!