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CS330
Lecture Notes

1-12-18

What does a simple database contain?
users $\longleftrightarrow$ program $\longleftrightarrow$ Database

- Bottom Part (Disk Storage)
  - Data is stored here
  - Indices
  - Data Dictionary (Metadata)
  - Statistical Data
  - DBMS hides details of how data is stored and maintained (Data abstraction)
    - Why is it important?
      Not to overwhelm the user, security and concurrency.
- Middle Part of DBMS
  - Query processor helps DBMS to simplify and facilitate access to data
    - Query: A statement requesting information
    - Queries are represented by a language (Database language)
    - There are two parts: DDL (Data definition language), DML (Data manipulation language)
  - Storage Manager is important because DB typically requires a large storage space
    - Buffer Manager
      - Fetch data from disk storage into main memory
      - Decide what data to cache into main memory
    - File Manager
      - Manages space allocation onn disk storages
    - Authorization and integrity constraints
      - Tests for satisfaction of integrity constraints
      - Checks authority of users
    - Transaction Manager
      - A unit of program that accesses and updates data items
      - Who initiates a transaction? SQL or programming language using ODBC/JDBC
      - What does transaction manager do? Ensures ACID properities
        (Atomicity, Consistency, Isolation, Durability)
      - **Atomicty** (All or none transaction)
      - **Consistency** (Preserves consistency of DB)
      - **Durability** (After successful funds transfer, new values of A and B must persist, even if system fails)
      - **Isolation** (For two transactions T_i T_j, it appears to T_i that either T_j finished execution before T_i started or T_j started execution after T_i finished)

- DBMS solves these 9 problems
    1. More complexity
    2. Data Redundancy
    3. Data Inconsistency
    4. Difficulty in accessing data
    5. Data Isolation
    6. Integrity Problem
    7. Atomicity problems
    8. Concurrent-access anomalies
    9. Security Problems