

Today's Purpose:

Provide motivating examples in designing DBMS.

What is the purpose of DBMS: To answer Queries efficiently and correctly!

### 1.) Design Goals of DBMS

- a. Correctness
- b. Efficiency
- c. Concurrency Control:
  - Processes queries as one whole this is slow
  - Data access is frequent
  - Data Base becomes large
    - i. Interleaving of computations of different queries **Necessity** because of I/O. Better performance.
    - ii. How do we know the interleaving is done correctly?
- d. Recovery (from system failure)

### 2.) Why Study DB?

- a. Important to computer Software Systems
- b. It composes many fields OS, AI, etc...

### 3.) Features of DBMS

- a. **Supports ad hoc queries with a query language. DBs provides a separation of application and data. Eg app developer does not need to know the data storage or form.**
- b. **An automatic optimization towards better performance.**

### 4.) Data Model: is the formal description of all data in the DB.

- Relational model: is the dominate one
- (DB) data schema: a particular description of data using a model
  - Just design (no data!)
  - Rules/Blueprints for the "SHIP"
- (DB) data instance: materialized DB built to the Schema
  - Real
  - Materialized
  - DB built to the Schema
  - "The SHIP"
- EX: university DB
  - Relational model ← Blueprint Like "Excel spreadsheet" in rows/columns and tables
- DB Schema:
  - Students (Sid,Name,Login,Age,Gpa)
  - Courses (CID,Name,Credits)
  - Enrolled (Sid,Cid,Grade)

- Instance:  
Student table

Sid	Name	-----
101	Jack	-----
102	Jill	-----
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Course table

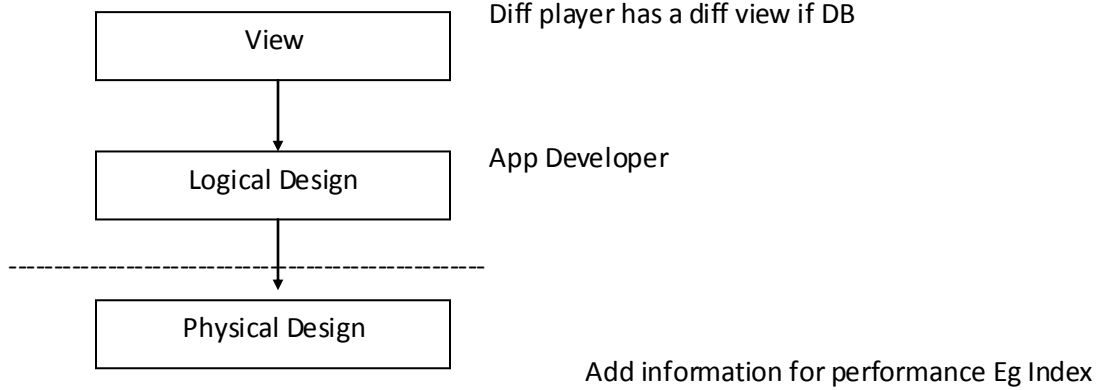
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Enrolled table

		-----
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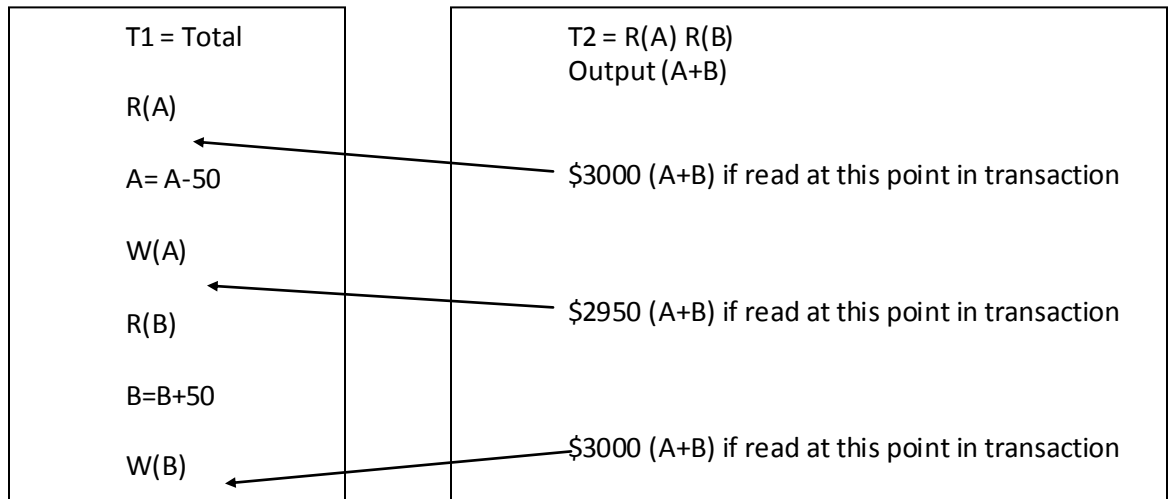
**REMEMBER rule for validating are schema not instance!**  
User needs to know only schema.

5.) Data Abstraction in DB:



6.) Concurrency Control: Issues  
Consistency of DB may be violated

Original total of Account A and B:  $A+B = 3000$   
 $A=1000$   
 $B=2000$



7.) Recovery: we must be able to recovery sys crash without having lost any information.