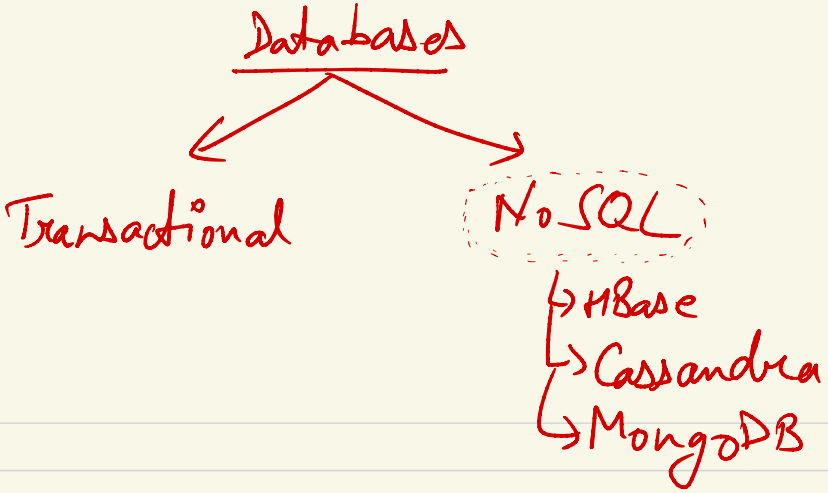
Databases

It is an organized collection of Data so that it can be easily accessed and managed.



* DBMS (Database Management System)

Software application/programs which helps to store & manipulate the data is known as DBMS.

These application provides a complete environment to store the data and

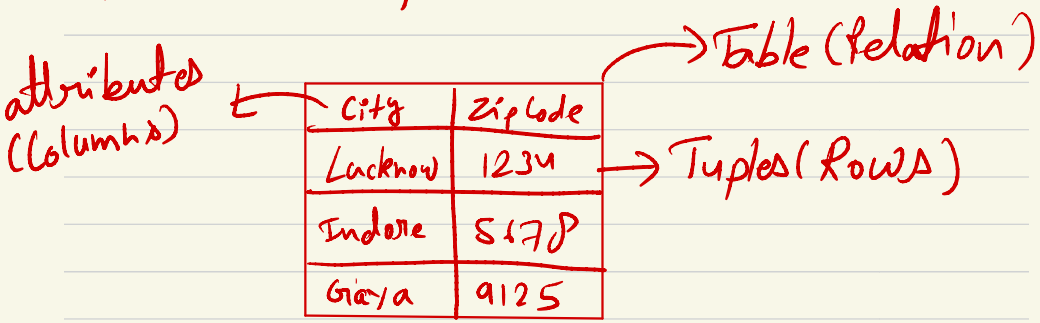
functionalities to interact with the data via some query language support.

RDBMS (Relational Database Management System)

Those database Management systems where data is stored in such a way that some relationship can be stablished with the help of key references.

Relation = Table (stores data in the row-column form)

Data = Tuples (Rows)



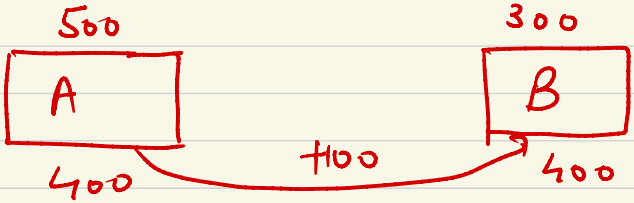
City_ (Table)

Example of RDBMS

- MySQL (**)
- SQL Server (**)
- Oracle (**)
- PostGres (**)
- SQLite
- DB2

Main purpose to use RDBMS because they support ACID properties.

* Transfer Rs 100 from Account A to B



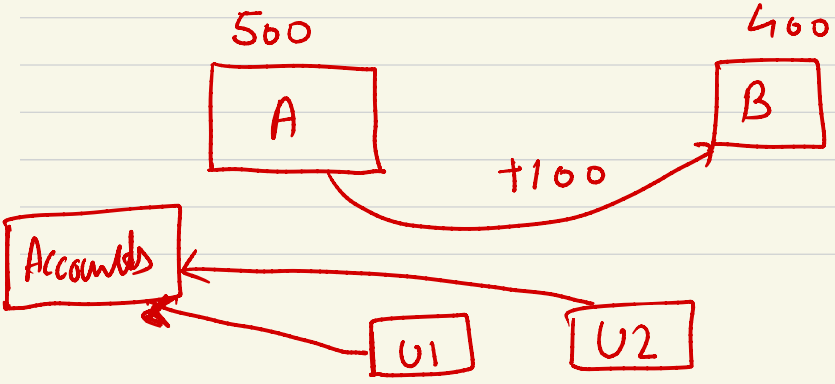
- Debit 100 from A =
- Update value in Account A =
- Credit 100 in B =
- Update value in Account B =
- Save everything (Commit) =

Transaction → Smallest unit of execution

ACID

* **Atomicity**: It means if any operation is performed on the data either it should be performed completely or should not be executed at all. There will not be any partial execution.

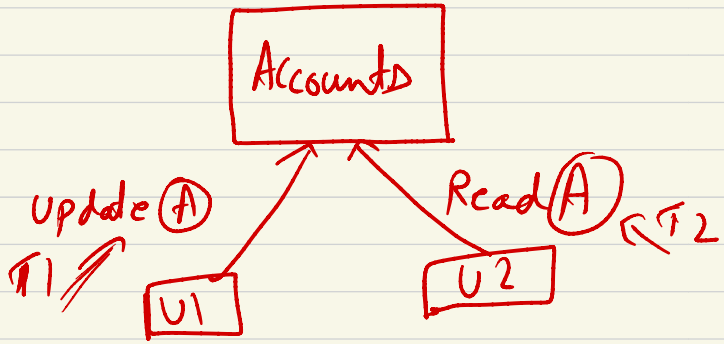
x) **Consistency**: The values of the data after any operation should be preserved. The integrity of the data should be maintained.



500 400 → Inconsistent

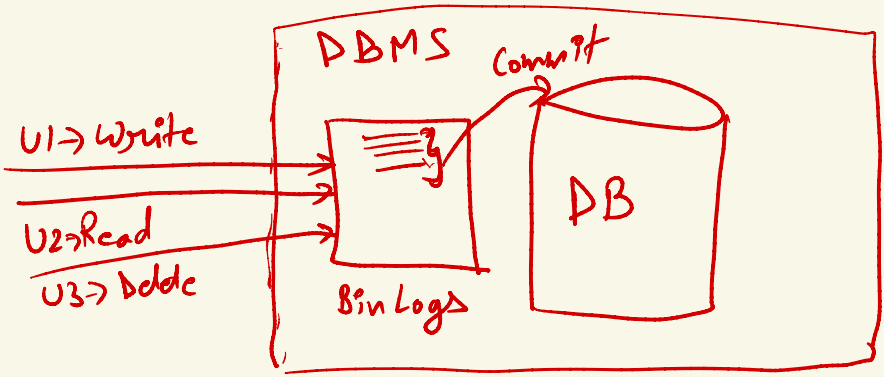
To maintain Consistency → Commit
→ Rollback

*) Isolation : It means, in the databases no transaction should impact the execution & data processed by another transaction if they are running concurrently.



*) Durability : The term durability ensures that the data after the successful execution of the operation

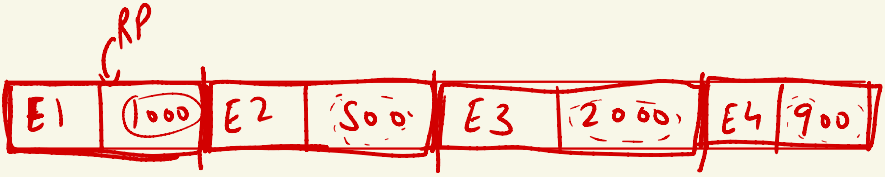
becomes permanent in the database. The durability of the data should be so perfect that even if the system fails or leads to a crash, the database still survives.



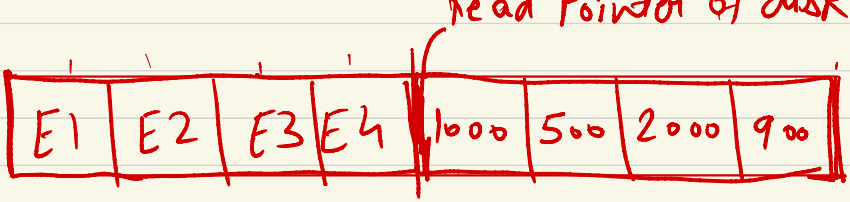
Whenever we perform CRUD operations or Insert/update/delete or any operation which changes the data values, so first those changes will be written in the log file (Write Ahead log). It is also an Two Phase Commit.

Storage Type → Row Based (RDBMS)
Storage Type → Column Based (NoSQL)

Row Based → Complete Row will be stored in contiguous memory location.



Column Based → Column values will be stored in contiguous memory location



Seek Time (Row based) > Seek Time (Column Based)

Concept of Keys

- Primary Key
- Foreign Key
- Candidate Key

Employee (e_id is PK)

eid	name	d_id
1	E1	100
2	E2	200
3	E4	100
4	E5	300

(d_id is FK)

Department (d_id is PK)

d_id	d_name
100	HR
200	ENG
300	OPS

*) Primary Key : Any columns which can uniquely identify a record in the table. Each value is distinct and Primary key column can not hold NULL Values.

* Foreign Key: It is a primary key of a table which has been referred in another table.

* Candidate Key: Any other column which can work like a primary key apart from original primary key, it will be known as candidate key. Ex: Passport number of employee.

* Composite Key: When we use more than one column to act like a primary key, it is known as composite key.

SQL : (Structured Query Language)

The language support system to interact with the databases.

simply → Programming language for the databases.

Category of SQL Commands

*) DDL (Data Definition Language)

- CREATE
- DROP
- ALTER
- TRUNCATE

*) DML (Data Manipulation Language)

- INSERT
- UPDATE
- DELETE

*) TCL (Transaction Control Language)

- COMMIT
- ROLLBACK

*) DQL (Data Query Language)

- SELECT

*) DCL (Data Control Language)

- GRANT
- REVOKE