Importance of Data

→ Computers → Data
→ Internet → Data
→ AI → Data

} Database → SQL

Data is the new oil.

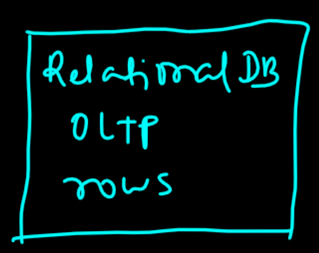
Database → Shared collection of logically related data designed to meet the info needs of the organization.

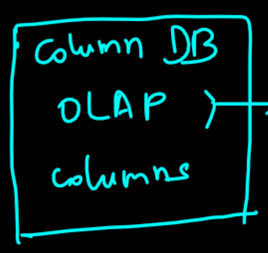
Reasons for Database
- Data Storage
- Data analysis
- Record keeping
- Web Application

Only 4 operations
C → Create
R → Retrieve
U → Update
D → Delete

Properties of Ideal Database
1. Integrity → Accuracy + Consistency
2. Availability → Always on 24x7
3. Security
4. Independent of Application.
5. Concurrency. → parallel usage possibility.

Types of Databases :-
1. Relational Database → SQL → tables Eg: MySQL, Postgre, oracle
2. NoSQL Database → Not only SQL → structured + unstructured. Eg. Documents, images, video (mongoDB)
3. Column Database → store data in columns not rows → Eg. Amazon redshift, Google Bigquery.
4. Graph Database → Facebook → Amazon Neptune, Neo4j (fb)
5. Key - value database → Key value pairs → Eg. REDIS





Relational Databases. → SQL Databases.

Table is called a 'relation'

Column → Attributes

Row → tuple

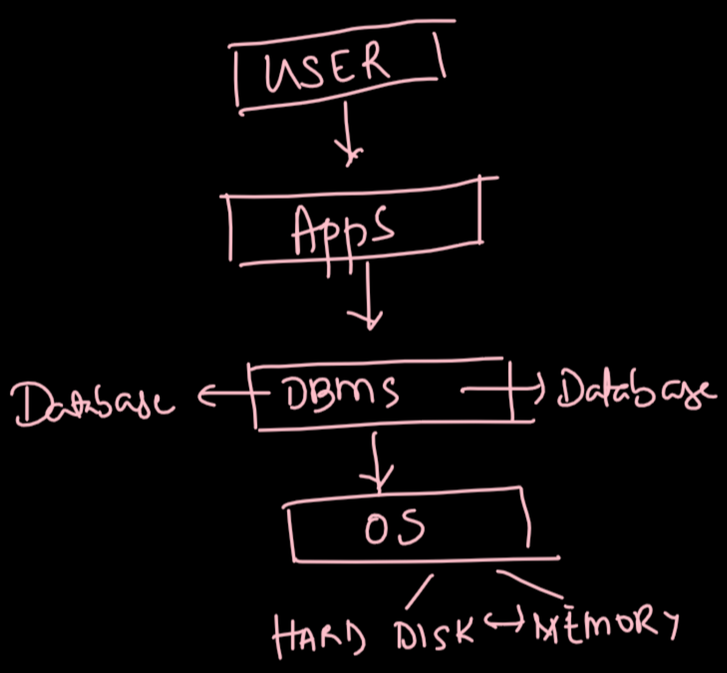
No. of rows = Cardinality of relation

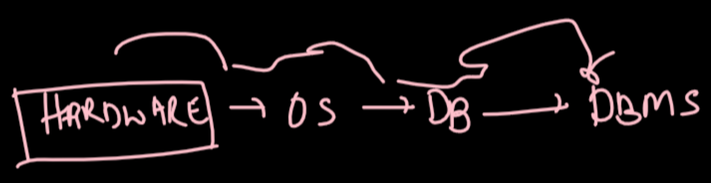
No of colums = Degree " "

Null values → Null.

Database Management System (DBMS)

- Software to manage and access.





Functions of DBMS

1. Data management → CRUD.
2. Integrity
3. Concurrency
4. Transaction
5. Security
6. Utilities → import/export, user manage, backup.

MySQL → MySQL workbench.
↳ Apache XAMP.

DATABASE KEYS :- → is an attribute (columns) that uniquely identifies a row.

DATABASE KEYS

Keys play important role in integrity and reliability of Data.

Types

1) Super key → set of columns which uniquely ids a row within RDBMS

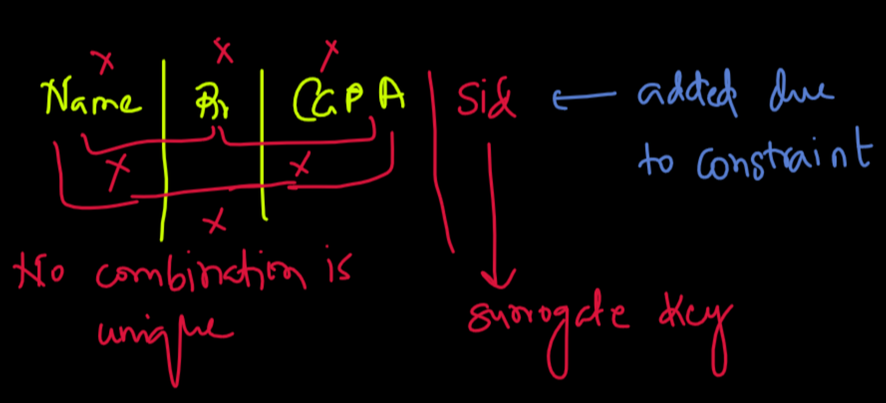
2) Candidate key → minimal super key → uniquely identifies a tuple
   - minimal: no redundant attributes.

3) Primary key → only one key → uniquely ids a tuple
   - Cannot have null & no duplicates. (mandatory)
   - → good to have
     1) Numeric
     2) Small
     3) Should be a constant

4) Alternate key = Candidate Key − Primary key

5) Composite key = Primary key ≥ 2 or more attributes (columns)

6) Surrogate key =



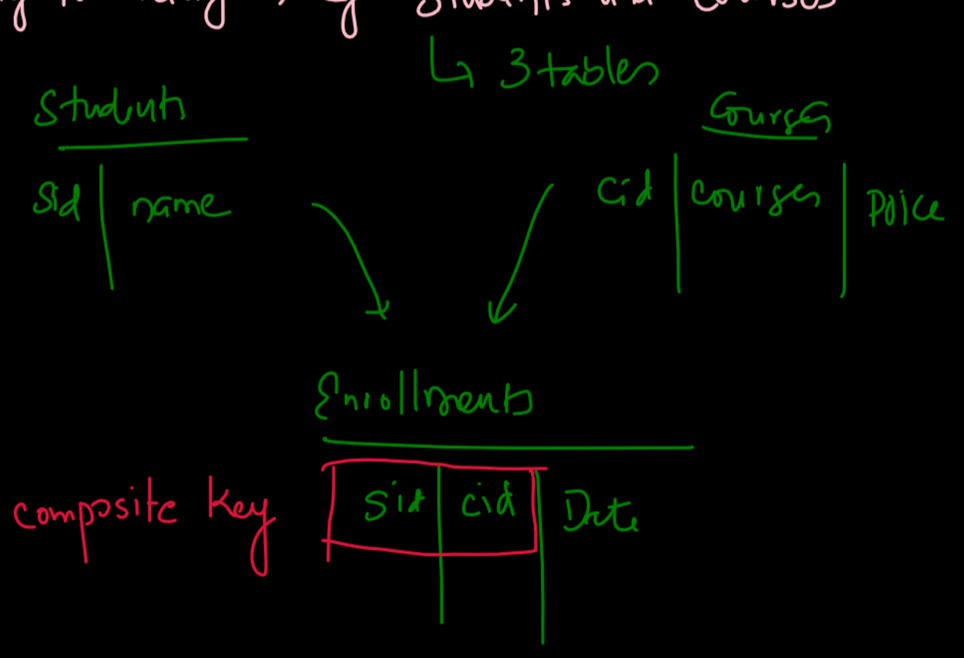
7) Foreign key = Primary key of some other table used in existing table.

It establishes relationships b/w tables!

Cardinality of Relationships

No of occurances of one entity ∈ another entity → which can be made into a table.

1) One to one → Eg:- Person and his DL. → One table
2) One to many → Eg:- Student and college br. → 2 tables
3) Many to many → Eg:- Students and courses → 3 tables



Drawbacks

1. Complexity
2. Cost
3. Scalability → especially in RDBMS.
4. Data integrity.
5. Security
6. Data Migration
7. Flexibility.