Database Fundamentals

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Database fundamentals

SQL is a general programming languages which run databases. Before knowing about SQL, you must have to know about databases.

we will learn SQL, from the prospective of data analyst.

Importance of Data

Data is the new oil.

Bussiness grow from 3 main stages;

i) Computer → It works on data
ii) Internet → generate data
iii) AI → Built with data

[In every stages, Data is used]

Data are stored in Database

What are Database?

Database are the software that organize, manage and store data. We can retrive data in any format (is the best part)

Databases Uses:

i) Data storage: It is used to store large amt. of unstructured data and making easily accessible, searchable, and retrivable.

ii) Data Analysis: A database can be used to perform complex data Analysis, generate reports, and provide insight into the data.

iii) Record Keeping: A Database is often used to track of important records, such as financial transcation, customer information.

iv) Web Applications: Database is the most important component for web applications for providing dynamic content and user management.

It doesn't matter how complex the structure of database, we only do CURD → Delete (this is a good part of database)

CURD: Create, Update, Retrival

Properties of Database

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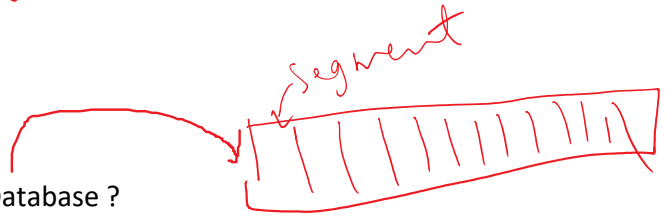
Properties of Database

1) Integrity → Accurate + Consistency
2) Availability → 24 x 7
3) Security → It must be important
4) Independent of Application → fb and wid, fb apple, fb Tablet → same database (we must see all message from all devices)
5) Concurrency → Parallel
If user want to get same data simultaneously, they must provided with it.

Types of Databases:

1. Relational Databases: It is known as SQL database, these database use a relational model to organize data into tables. (rows, columns)
2. NOSQL Databases: This is specially designed for large no. of unstructured data such as img, vdo, doc. (mongoDB)
3. Column Databases: This store data in columns rather than rows, making them well suited for data warehousing & analytical applications.
4. Graph Databases: This store data in graphic-structured, such as social network connections or recommend system.
5. Key-value Database: Store data in key and values, making them well suited for caching & simple data storage needs.

RNoC GK way to remember



How Data are stored in Database ?

The data in a database is grouped into a series of database records. Each database record is composed of smaller groups of data called segments. A segment is the smallest piece of data IMS can store.

Relational Database

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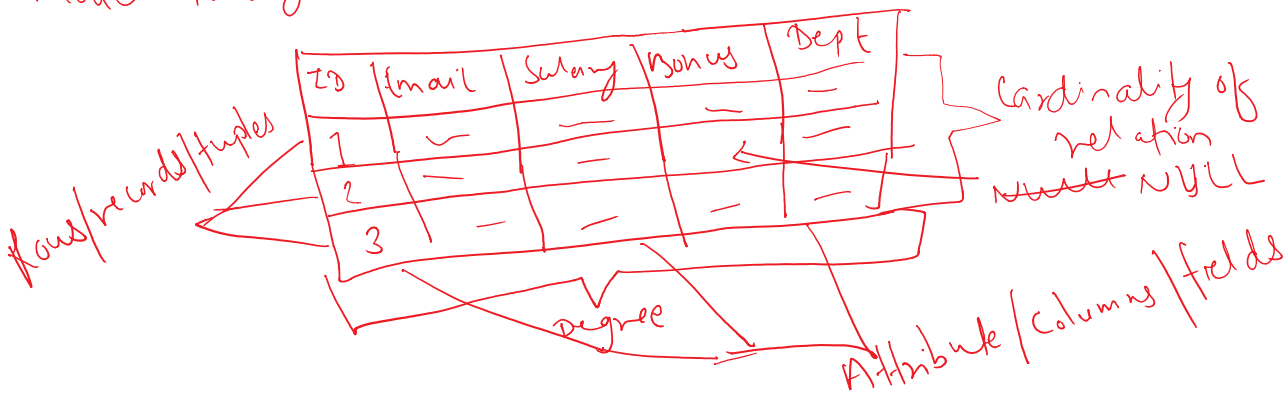
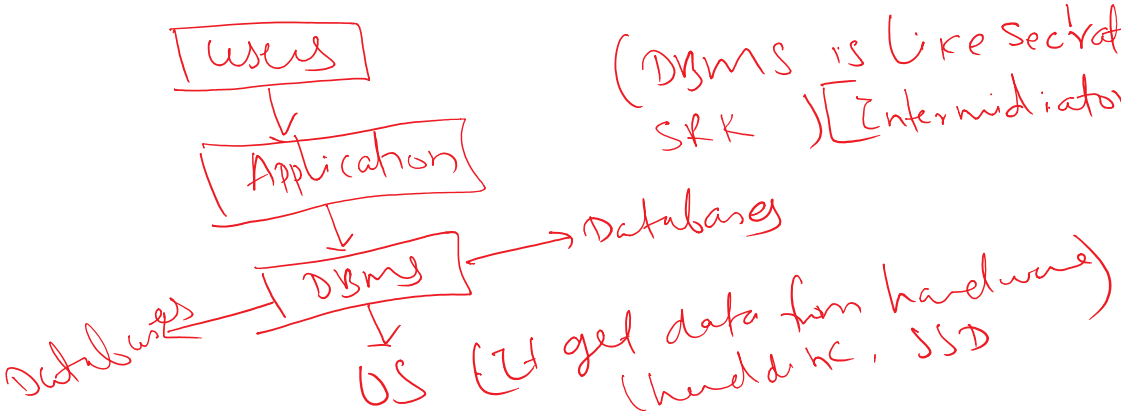
Relational Databases

also known as SQL database, these databases use a relational model to organize data into tables with rows & columns.



What is DBMS?

DBMS is a software system that provides the interface and tools need to store, organize and manage data in database.



(DBMS is like Secretary of SRK) [Intermidiator]

Functions of DBMS

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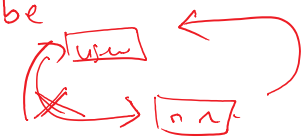
Functions of DBMS

i) Data management - store, retrieve & modify data

ii) Integrity - Maintain accuracy & consistency of data

iii) Concurrency - Simultaneous data access for multiple users

iv) Transcation - Modification to database must either be successful or must not happen at all.
{ If transcation is n't successful while paying, whether it will complete or it will return to your a/c }



v) Security - Access to authorized users only.

vi) Utilities - Data imports/Export, user management, backup, logging

Practical

mySQL → mySQL workbench
→ Apache / Xampp

Database Keys

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Database Keys

A key in a database is an attribute or set of attributes that uniquely identifies a rows in a table.

Rollno.	Name	Branch	Email

1. Super Key : It is a combination of columns that uniquely identify any rows within a RDMS table.

Ex:
- rollno. + email
- roll + name → Super Key
- roll + branch
- roll + email
- Name + Branch + Email
- rollno. + branch + Name
- rollno. + branch + Name + Email

2. Candidate Key : It is a minimal super key, meaning it has no redundant attributes.

3. Primary Key : It is a unique identifier for each tuples in a tables. There can only be one P.K in a table, and it can't contain null values.

4. Alternate Key : Candidate key that is n't used as P.K [CK-PK]

5. Composite Key : It is a p.k that is made of 2 or more attribute. Sometimes single attribute is n't sufficient to uniquely identify a tuple in a table.

sid	cid	date

sid + cid → key

6. Surrogate Key

sid	name	branch	cgpa

7. foreign key : It is a p.k from one table that is used to establish a r/ship with another table.

student

Sid	name
p.k	

course

Cid	name
f.k	

enrollment

sid	cid	Date	payment
f.k	f.k		

Cardinality of Relationships

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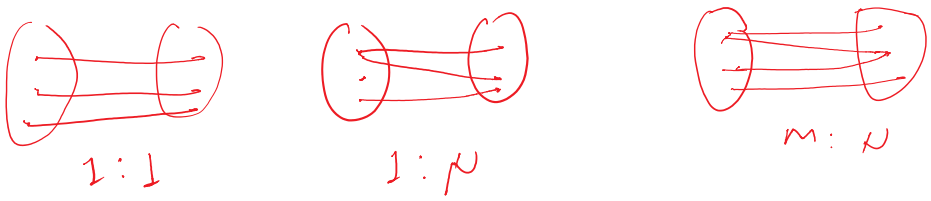
Cardinality in database r/n refer to the number of occurrance of an entity r/nship with another entity.



Drawbacks of Databases

1. Complexity: Setting up & maintaining a database can be complex & time-consuming, especially for large & complex system.
2. Cost: Hardware, S/w, personnel
3. Scalability: difficult to manage large amount of data
4. Data Integrity: Multiple user are updating data simultaneously
5. Security: unauthorized access → cyber security

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