

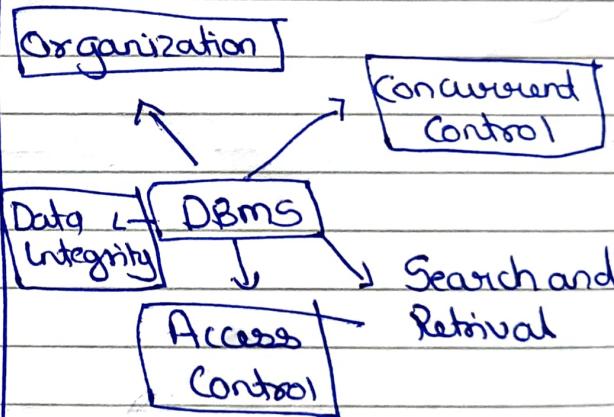
- ① Introduction to DBMS.
- ② Data Models.
- ③ RDBMS.
- ④ SQL
- ⑤ Transaction and Concurrency Control
- ⑥ Query Optimization.
- ⑦ Scalability and performance optimization.
- ⑧ Data Integrity and Security.

Introduction to DBMS.

Data, Database and file System.

- ① Anything which gives information or number is called Data.
- ② The Data are stored in some manner is called Database.
- ③ In Early Day the data are stored in some file system which is very difficult to update and sort them.

④ DBMS and its application.



Data Models

Hierarchical Data Model

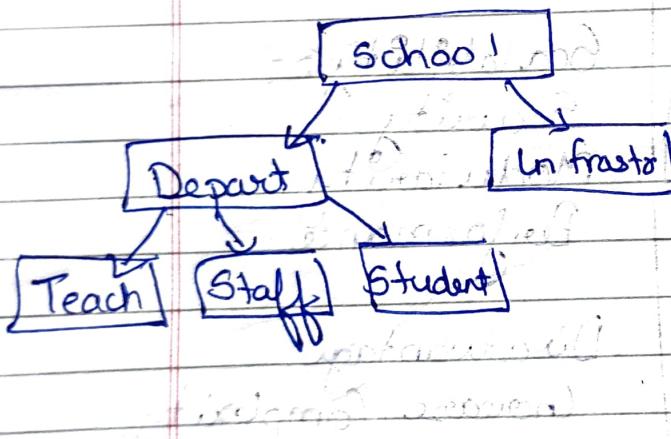
Network Data Model

Relational Data Model

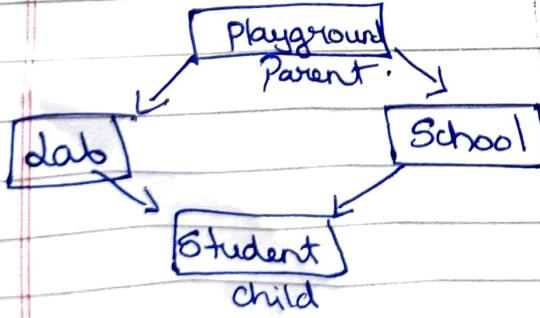
Entity - Relational Model

Object - Oriented Data

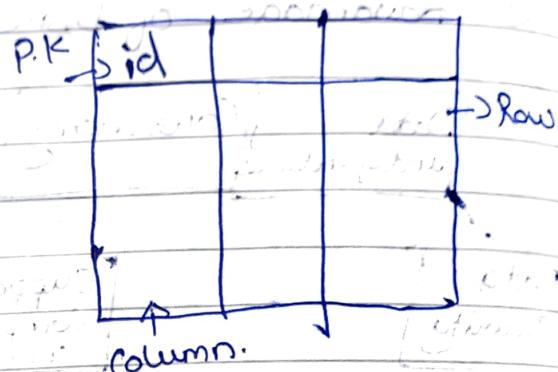
① Hierarchical



② Network



③ Relational Data Model



④ Entity-Relational

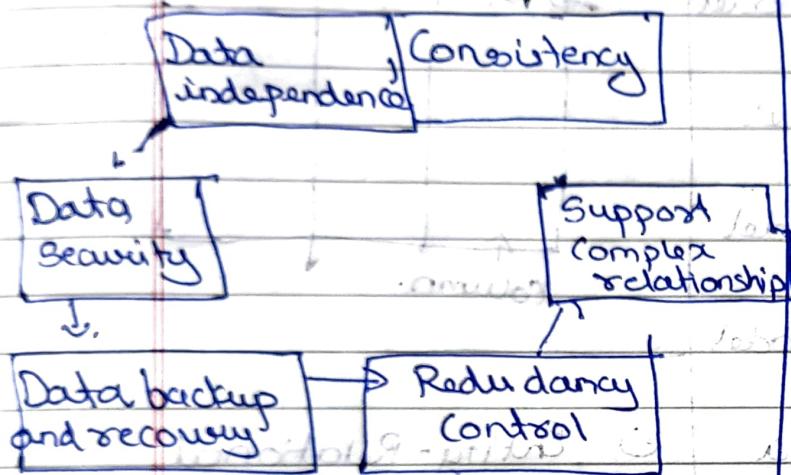


Entity Relationship

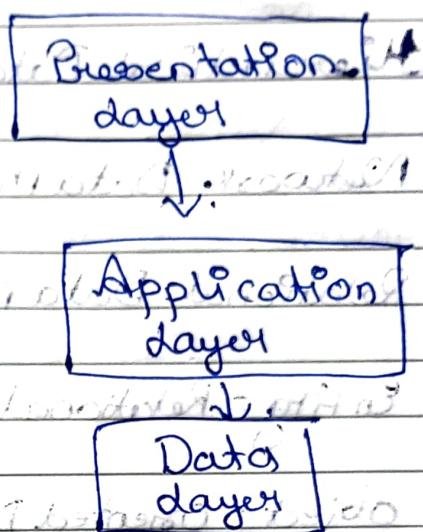
Strong Entity.



○ Advantages of DBMS



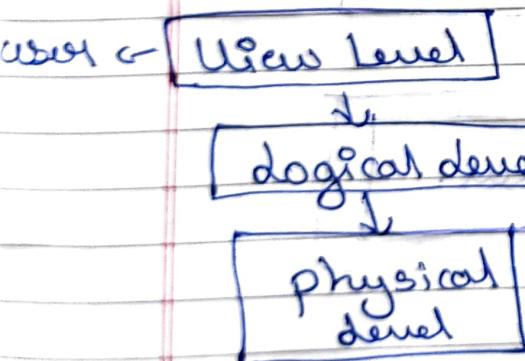
○ Data Architecture



○ Disadvantages of DBMS



○ Data Abstraction



It hide complicated details that user don't need worry about. Is called Data Abstraction.

○ Advantages of DBMS

Scalability, Security, Modularity, Performance

Disadvantage, Increase Complexity.

Degree Types.

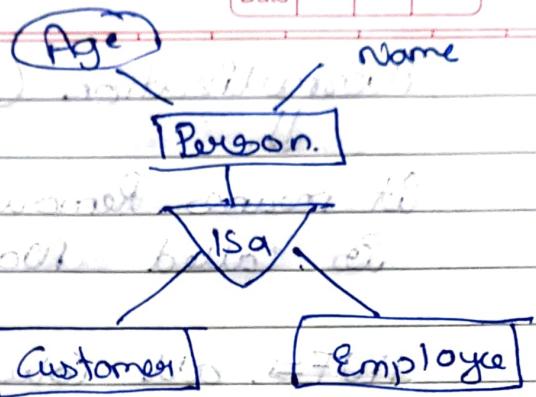
Unary degree \Rightarrow Single attribute

Binary \Rightarrow two attributes

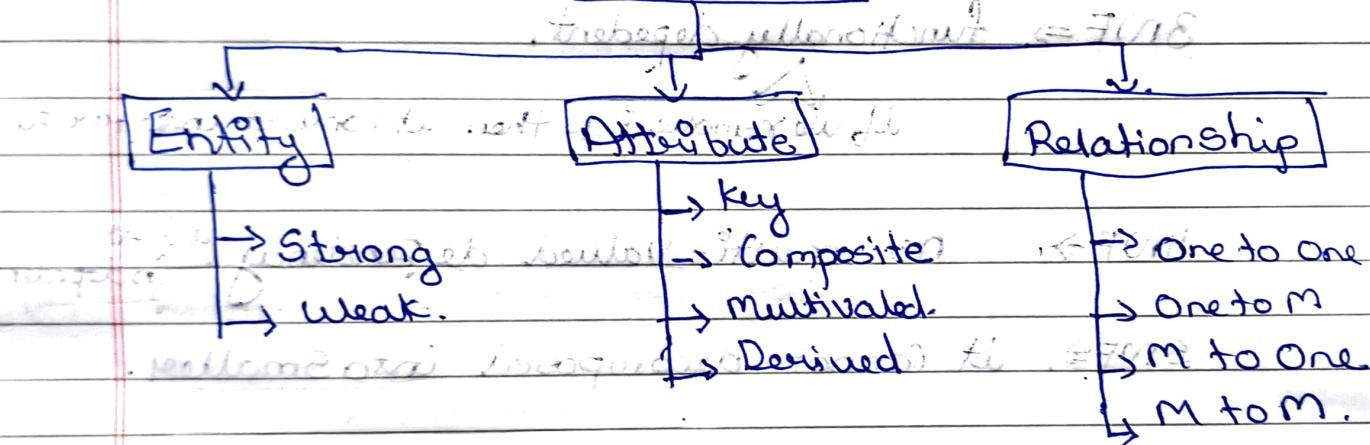
Ternary \Rightarrow three attributes

N-ary \Rightarrow > 3 .

Relationship Degree \Rightarrow 0 to 1, 1 to 1, 1 to many, many to many



ER Model



Keys in DBMS

Candidate key

Primary key

Foreign key

Superkey

Normalization (1, 2, 3NF).

↓.

It means Remove duplicate from database
is called Normalization.

1NF \Rightarrow all columns contains individual value and,
imp \rightarrow [fully]

2NF \Rightarrow non-key attribute depend on primary key.

3NF \Rightarrow functionally dependent.

if we remove P.K then it convert into two part.

4NF \Rightarrow no multi-valued dependency. all are independent.

5NF \Rightarrow it cannot decomposed into smaller.

Demormalization \Rightarrow adding more data for better understand and reading performance
is called Demormalization.

Intension
it is blue print ki
aisa kissa hoga
name, age.

and Extension
it uses Real int or float
that actual coding part
is called Extension.

new code will do no hard coding, + we will

use it directly after command ~~using~~ Common S.D.L Command.

- (1) Insert \Rightarrow Insert Data into table.
- (2) Create \Rightarrow Create Table.
- (3) Drop \Rightarrow Delete Table with data.
- (4) Alter. \Rightarrow modify.
- (5) Truncate \Rightarrow Delete all row without delete the table.
- (6) Commit \Rightarrow End of transaction.
- (7) Rename \Rightarrow Rename the object.

Delete \Rightarrow , Particular cell.

object have all segment named in

Data Integrity and Security.

(a) RBAC (Role Based Access Control).

Role Based Access Control.

Roles → Define based on job function (e.g. - admin, manager, employee)

permission ⇒ Specific access right assigned to roles.

Users: Individuals assigned One or more based on their responsibilities.

(b) Encryption.

To hide the Original data and added Encrypted Value.

(c) Data masking Techniques.

⇒ it can Create duplicate of data So they can Experiment or Testing it is called.
Data masking.

it Cannot hamper the real data.

Scalability and performance optimization

Vertical and Horizontal Scaling

Vertical

Same Computer but we increase its capacity by changing RAM or battery so it can use better and fast is called Vertical Scaling.

Horizontal

\rightarrow 1 P.C. we can use first one computer if it works slow so we can purchase 5 more computers. the only problem in this is cost.

Shared

When data is so big so we can divide it so work better to increase performance.

We can sort data in many ways.

Range (1-10), (21-30)

Hashed:- 1 2 3
1-10 20-30

(i) Query optimization

In SQL we can search in database. So we can use formula to make search faster.

↳ Use
I have created SQL notes. plz prefer this

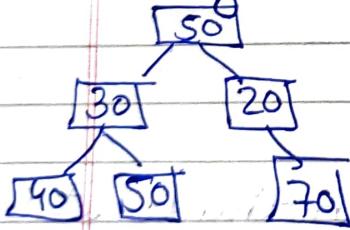
e.g., joins, limit, Order By, Select.

(ii) Indexing

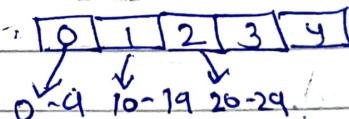
Ordered Dense } all are use for Query
 Primary Sparse } optimization and
 Secondary } majority using HashTable
 Cluster

(iii) B and B+ Tree

Binary Tree



B+



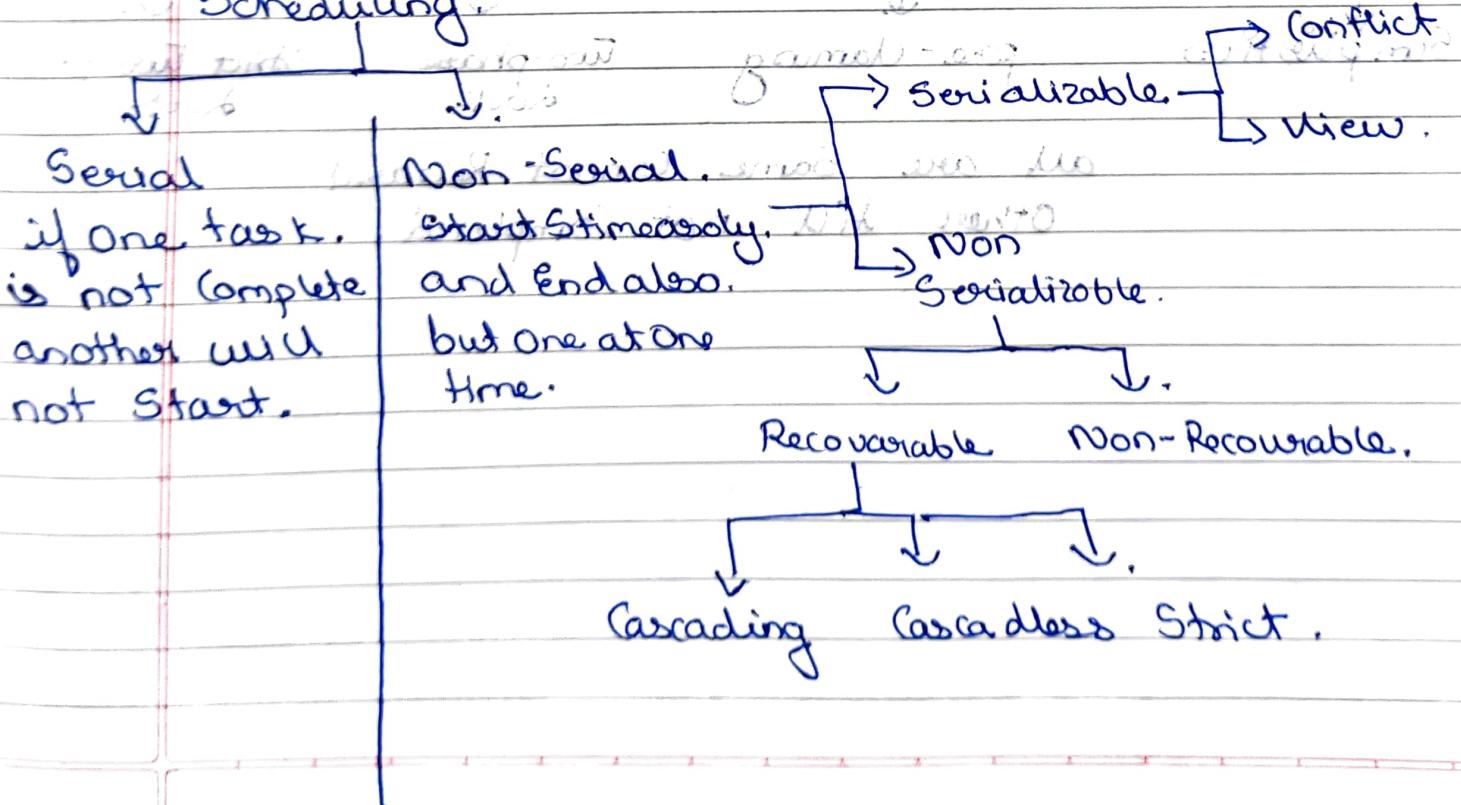
Transaction and Concurrency Control.

A.C.I.D properties.

<u>A = Atomicity</u>	<u>C = Consistency</u>	<u>I = Isolation</u>	<u>D = Durability</u>
it means Entire Transaction yes or no. not Partial.	it Ensures Correctness of Database. Sender → Reduc. Database updated. +200% ↳ Occur then my chance.	Multiple Transaction Occur. i.e. does not depend on. another to be ↳ Occur then my chance.	

In two states how much do I want so me. And if system failure or hard disk broken then also my data is Safe in backup.

Scheduling.



(C) Database Recovery Management

↓.
Backup and
Restore.

↓.
Log-Based
Recovery

↓.
Shadow
Paging

↓.
Checkpointing

↓.
Rollback and Rollforward

(D) Locking Protocol.

↓.
Shared lock (S-lock)

↓.
Exclusive locks (X-locks).

↓.
Data can be Read we
cannot write it. It is called
Shared lock.

↓.
Read and write but one
task is open, another task
will not open till released.

↓.
Simplistics

↓.
pre-claiming

↓.
two-phase
lock.

↓.
strict two-phase
lock.

↓.
all are same. Cannot Release
other till not completed.

(C) Serializability and Concurrency Control.

Serializability :- Multiple Transaction can occur at same time if we can perform same and consistent data, even when transaction overlap in time.

Types of Serializability.

- (i) Conflict :- If resource is empty it can swap the task so it uses better resource to better task.
- (ii) View :- Eg - T₁ and T₂ first T₁ \Rightarrow Write, T₂ \Rightarrow Read. If T₂ also as T₁ Write So we can directly give T₁ Write to T₂.

Concurrency :- Multiple User access database. So the database not crash we can use Concurrency.