

2. DataBase Design and Architecture.

(Marks:-17)

1) Essentials of DataBase Design:- 11

Ans.

In order to gain a better understanding of how the DataBase work? As well as why DataBase design required?

In design DataBase to organized the data. Data is organized in form of table in database. There are usually set of tables with least a Data redundancy in consistency and to have relationship between table the DataBase. Designer Applies techniques like data Abstraction, E-R-Diagram, Normalizations.

This DataBase design is converted into logical form by application programmer using any standard DataBase management system such as Oracle, Access, My SQL, Ms SQL, Server etc.

Cust id.	Cust Name.	Cust City.	Cust Mo.	Agent id.	
1001	Patel Mul	Hmt	9537705904	3001	
1002	Raval Yash	Hmt	7436029505	3002	

I. Schema:-

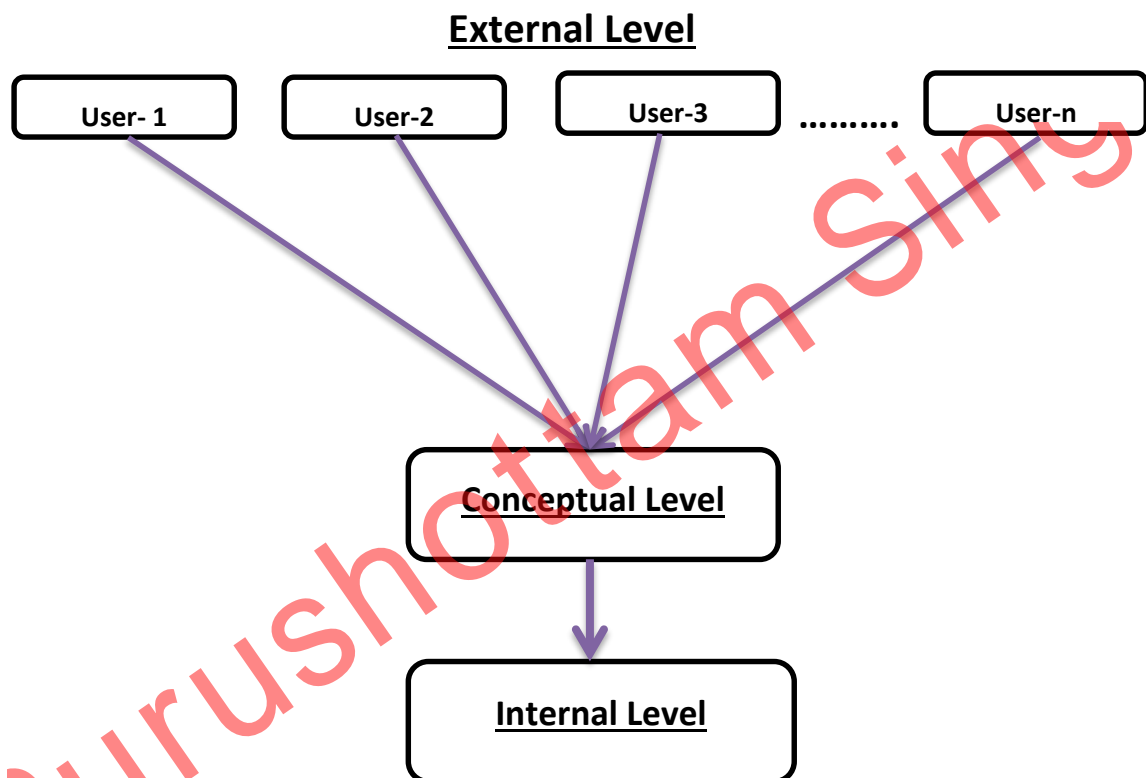
It is an overall plan of all the data item filed and record type stored in DataBase.

II. Instances:-

The term instance is known as state (snapshot) of the DataBase.

2) Explain 3(Three) levels of Architecture of DBMS:-

Ans.



It is also known as ANSI SPARC.

ANSI: - American National Standard Institute.

SPARC: - System Planning And Required Committee.

DBMS is collection of co-related files and set a program which are access and modified by different users.

This kind of file which are handle by system. High certain things or details of how the data is store and maintain in DBMS.

There are three types of architecture level in DBMS.

1. **External Level [Higher Level].**
2. **Conceptual Level [Middle Level].**
3. **Internal Level [Lower Level].**

1. **External Level [Higher Level]:-**

External level has two another names like **Logical view & Individual user view.**

Application programmer or End User or access the DataBase with the help of application program and Query language.

It's providing powerful and fixable security structure to hide parts of DataBase from user external level include those data attribute and interested by user.

This is highest level abstraction (ચોરી થયેલ ું) hide Describe "Where only part of entire DataBase".

Ex.

Name (10)

Address (20)

Phone (10) / (13)
DOB (08)
Pin Code (06)

2. Conceptual Level [Middle Level]:-

Conceptual level has another name like **community user view & global level.**

Conceptual level is logical structure of the DataBase and provides complete view of Data requirement by DataBase.

It's support external level or direct data which are already declare in conceptual level.

Ex.

Name character (10)
Address character (20)
Phone Number (10)/(13)
DOB Number (08)
Pin Code Number (06)

3. Internal Level [Lower Level]:-

Internal level has another name like **physically level & Storage view.**

It is process of physically representation of data which also representation "How the store in the DataBase?" It is independent on hardware.

Ex.

Name character length of 0 up to 10.

Address character length of 10 up to 20.

Phone Number length of 10 up to 20.

DOB character length of 0 up to 8.

Pin code Number length of 0 up to 6.

3) Explain the Data Models:- Ans.

"Data model show the actual picture of the data".

In data model we describe "What" data to be stored and "What" age relocationship between them.

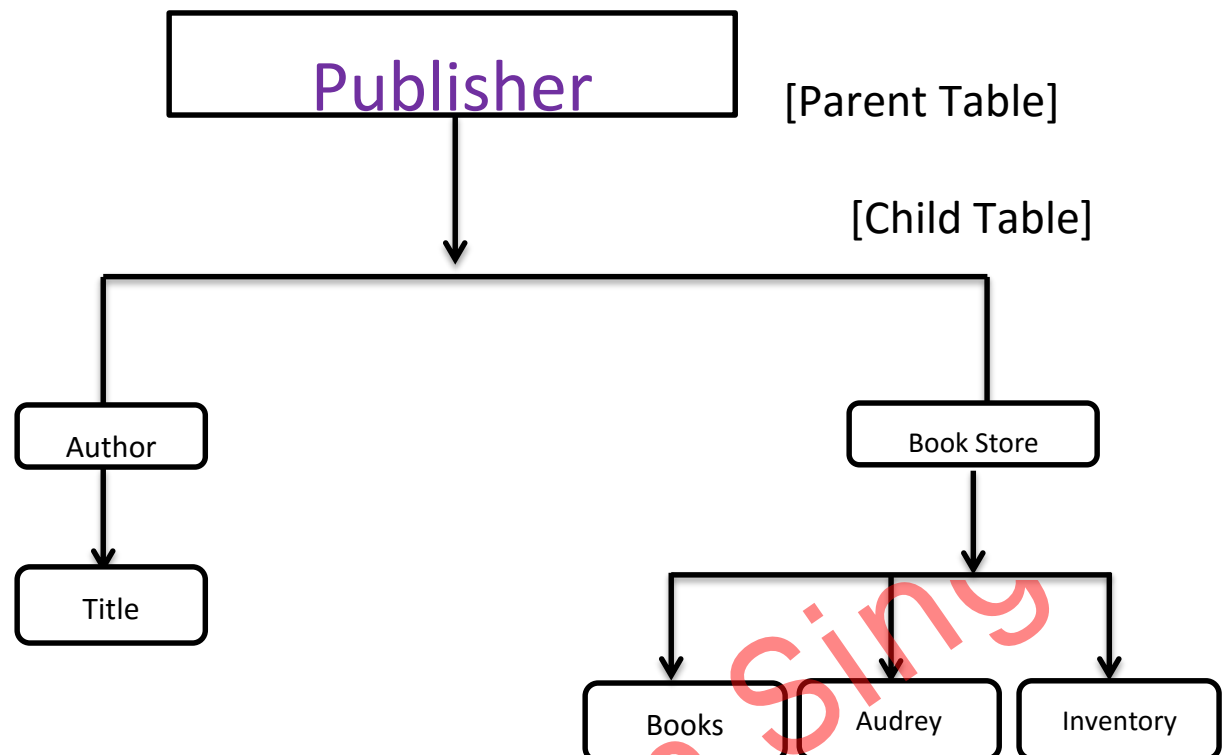
+ There are three types of the data model

1) Hierarchical Model.

2) Network Model.

3) Relational Model.

1. Hierarchical Model:-



- Data in hierarchical model represent by link between relation or record.
- In hierarchical record are organized in Tree fashion & Tree structure.
- Architecture of hierarchical model is based on concept of parent child relationship.
- In this model parent table stand at the top of the architecture which is link with child table.
- Data in parent table access by all child tables.
- Hierarchical work on many patterns.
- Every hierarchical model has only one parent table is also known as root table.
- Parent table have many child but child table have only one parent.

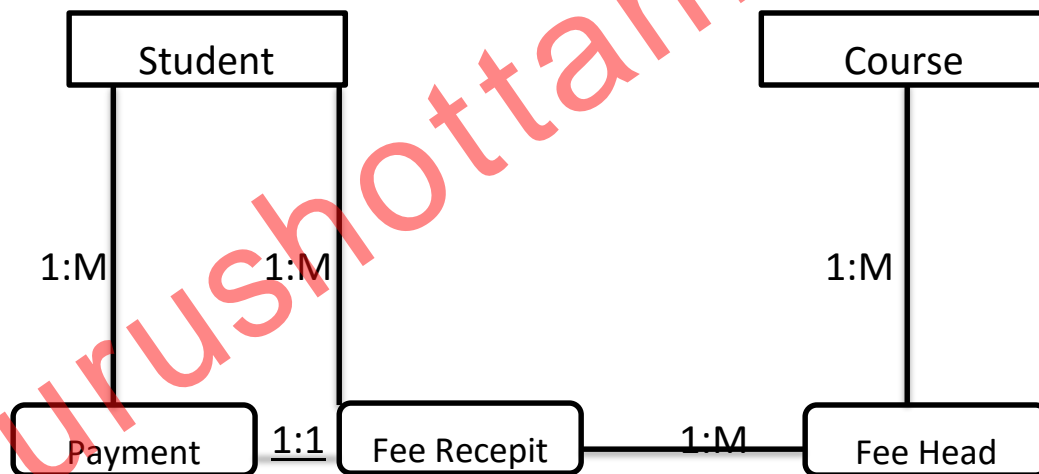
+ **Advantages of hierarchical model:-**

- Data can be retrieve quick from the model.
- Data integrity is easy to manage in hierarchical model.
- Data sharing, Data security & Data integrity will provide by hierarchical model.

+ **Disadvantages of hierarchical model:-**

- Duplicate data can be shared.
- It's complex to implement on system.
- User must familiar with structure.

2. Network model:-



- Network model present data in more than one parent per child relational ship.
- It's mean a network model a child table has relational ship with number of parent table.
- All boxes represent record type.

- It can be seen that fee receipt is owned by student course payment, fee head.
- In network model each link between two records represents one to many (1: M) relationship and fee receipt by one to one (1:1) relationship.
- Network model supports multiple parents to the same record so it avoids data redundancy.

Advantages of Network model:-

- It provides easy data access.
- Data integrity is provided by network model.
- It provides a conceptual simple.
- Its individual :-

DDL:- Data Definition Language.

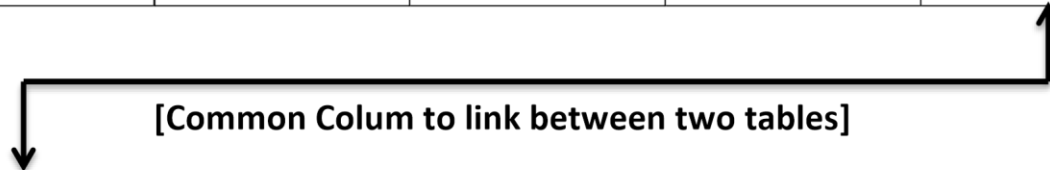
DML:- Data Manipulation Language.

Disadvantages of Network Model:-

- It generates system complexity.
- It has an absence of structure independence.

3. Relation Model:-

Customer ID.	Customer Name.	Customer City	Customer Mo.	Agent ID.
1001	Yash	Hmt	5637232323	3001
1002	Ankit	Idar	5272228278	3002



Agent ID.	Agent Name.	Agent City.	Agent Mo.	Agent Salary.
3001	Mul	Hmt	4587945723	4000
3002	Dhruv	Ahm	5523876772	5000

- In this model user view the DataBase by using simple table instead of more complex Hierarchical & Network Model.
- In relation data model database a represent by collection of table provide relationship between those tables.
- It represents in Raw & Colum represent data field.
- Figure show customers & Agent table.
- An about these two tables have common data field which is connect to other.
- With the help of this relationship user can share or retrieve data from both data.

Advantages of Relation Model:-

➤ Easy to use:-

The retrieving of any information is faster & easy therefore even first time user find result accurately.

- Flexibility information is easily derived from different kind of table.
- Security control authorize can be also implant more easily on a given table to a control data access.
- Data independence achieved with the help of normalization which avoid data redundancy problem.

→ Deification:-

(1) **Entities:-**

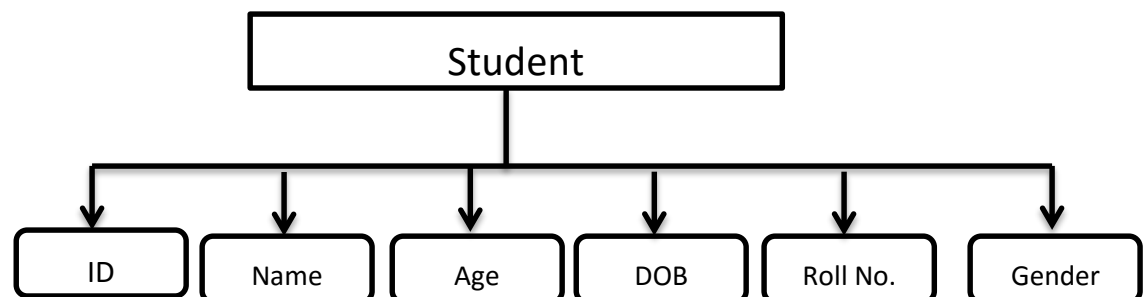
An entities is simple a person, place, even, things, for which wish to collect the data.

Ex. In university environment faculties, members, courses, students.

(2) **Attribute:-**

Each entities has certain characterizers known as attribute.

Ex.



4) Discuss about traditional set of operator.

Ans.

➤ There are 4 types of traditional set of operator.

1. **Union (U)**
2. **Difference (-)**
3. **Inter Section (\cap)**
4. **Cartesian (*)**

1. Union (U):-

In union operation we can union or gather one or more relation & get result which has unique record.

A	B
No.	Name.
1	ABC
2	PQR
3	XYZ

A	BA		B
No.	Name.	No.	Name.
1	PQR	1	ABC
2	XYZ	2	PQR
3	MNO	3	XYZ
	4		MNO

- In about ex. A&B with performing unique on these relations which have unique record.

2. Difference (-) :-

In difference operation we can remove common data from a given table & get a final result

A-B

A	B
No.	Name.
1	ABC
2	PQR
3	XYZ

A	BA		B
No.	Name.	No.	Name.
1	PQR	1	ABC
2	XYZ	4	MNO
4	MNO		

- In about ex. There two relations A&B with perform difference operation which remove common data of both relation & get result.

3. Inter section (\cap):-

In this operation give only a common data from relation.

$A \cap B$

A	B
No.	Name.
1	ABC
2	PQR
3	XYZ

A	A	B
No.	Name.	Name.
2	PQR	PQR
3	XYZ	XYZ
4	MNO	

□ An about ex. A&B are two relation and we can perform intersection operation & get final result.

4. Cartesian (*):-

If one table has four rows & other table has two rows. The product list of $4 \times 2 = 8$.

A	B
ID.	Name
101	Chirag
102	Ronak
103	Tirth
104	Pritesh

S.	Id.	Name	S.
	101	Chirag	J ₁
J ₁	102	Chirag	J ₂
	103	Ronak	J ₁
J ₂	104	Ronak	J ₂
	105	Tirth	J ₁
	106	Tirth	J ₂
	107	Pritesh	J ₁

108	Pritesh	J ₂

□ An about ex. A&B is relation & can perform multiplication Cartesian get result.

5) Discuss about special relation operation in details

Ans.

➤ There are four types of relation operator.

1. Selection.
2. Projection.
3. Join.
4. Divide.

1. Selection:-

Selection or select **SQL [Structure Query Language]**
Filed value for attribute found in table.

Select can be used to list all or select row value for each attribute word.

Select yields horizontal sub set of table. **Ex.**
Person where id <105.

Person

ID.	Name
101.	Somiya
102	Archy
104	Mayuri
108	Sonal

Result of selection

ID.	Name
101.	Somiya
102	Archy
104	Mayuri

2. Projection:-

Projection or project product a list of all values for selected attribute.

In other words project yields vertical set of table. This due to deletion of duplicate types in the projection relation.

Person, ID.

Person Name

ID.	Name
101	Anant
102	Anant
103	Chirag
104	Chirag
105	Hetal
106	Hetal

Anant
Chirag
Hetal

3. Join:-

Join allow us to combined information from two or more table.

Employee

Salary

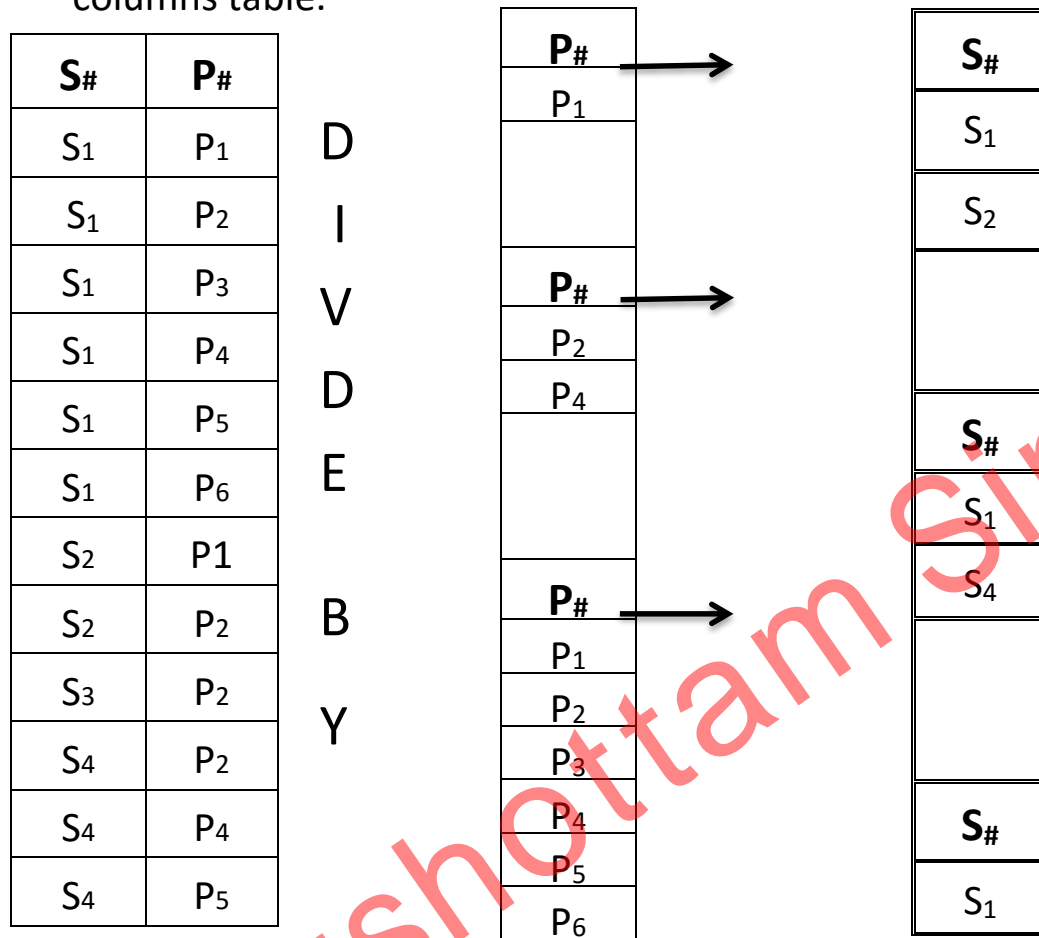
Combined

ID.	Name
101	Anant
102	Dhurv
103	Chirag
104	Hetal

ID.	ID.	Salary	Name	Salary
101	101	5000	Anant	5000
102	102	7000	Dhurv	7000
103	103	9000	Chirag	9000
104	104	8000	Hetal	8000

4. Divide:-

Divide required the use of one single column table & two columns table.



❖ Deification:-

1. Relation :-

R is relation on those N sets.

- It set of record n-tuples $(d_1, d_2 \dots d_n)$ such that d_1 belongs to D_1 , d_2 belongs to $D_2 \dots d_n$ belongs D_n .
- Set $D_1, D_2 \dots D_n$ are the domain of R.
- The value is degree of R.

Emp_code	Name	Designation
1.	Chirag	DBA
2.	Hetal	Programmer
3.	Rahul	Manager

- It has 3 domains –Emp_code, Name and Designation.
- It has 3 degree.
- The relation data model represents entities or attribute.

2. Tuples :-

Row of relation or table is referred as tuple.

- A tuple have having a set of n number of attribute is termed as n tuple.

3. Domain :-

The values for an attribute or column are received from a set of value known as domain. **Ex.**

Domain for coin is (Head/Tail).

4. Degree:-

Degree is related the number attribute in relation.

- Employee relation have three colon & relation have degree three.

5. Keys :-

Table within a database share common attribute that enable to link the table to gather such as attribute is called key.

6. Primary key :-

- (1) Having unique value in any giving row.
- (2) Can't contain null values.

7. Candidate Key :-

One or more attribute in relation that uniquely identify. Each value of entity.

8. Alternate key or Secondary Key :-

A candidate that is not the primary key is called an alternate key.

9. Foreign key :-

An attribute is one table whose value must either match the primary key in another table or be null.

Or.

It is part of primary key in a table or relation & also primary key another relation.

- ☐ It represent relationship between tables.

10. What is extensions & Intensions?

Ans.

The extensions:-

- ☐ The extensions of a given relation are the set of tuple appearing in relationship at given time.
- ☐ The extensions different with time by creating & deleting row.

The Intensions:-

□ The intension is a combined of two table.

(1) Naming structure:-

Related relation name & name of attribute.

(2) Integrity Constraints:-

A. Key Constraints B. Referential Constraints C. Other Constraints

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