

Chapter

1

Data Management System (DBMS)

V.V.I

1. Explain about DDL and DML commands in SQL with examples.

→ Data definition language (DDL) consists of the SQL commands that is used to create, alter and drop and modify table of the database.

The common DDL commands are:

- a. CREATE

It is used to create a database or table.

For example: CREATE TABLE employee (id int, name varchar(30), address varchar(30), PRIMARY KEY (id));

- b. DROP

It is used to delete the table of database,

For example: DROP TABLE employee;

- c. ALTER

It is used to change or add any field in the table. For example: ALTER TABLE employee ADD phone VARCHAR(10);

2. Explain Hierarchical Database Model with example.

→ In a hierarchical database model, records are arranged in a tree like structure. All the records in the hierarchy are called nodes. Each node is related to the others in a parent-child relationship. Each parent record may have one or more child records and each child have only one parent. The top level record in the hierarchy is called the root record.

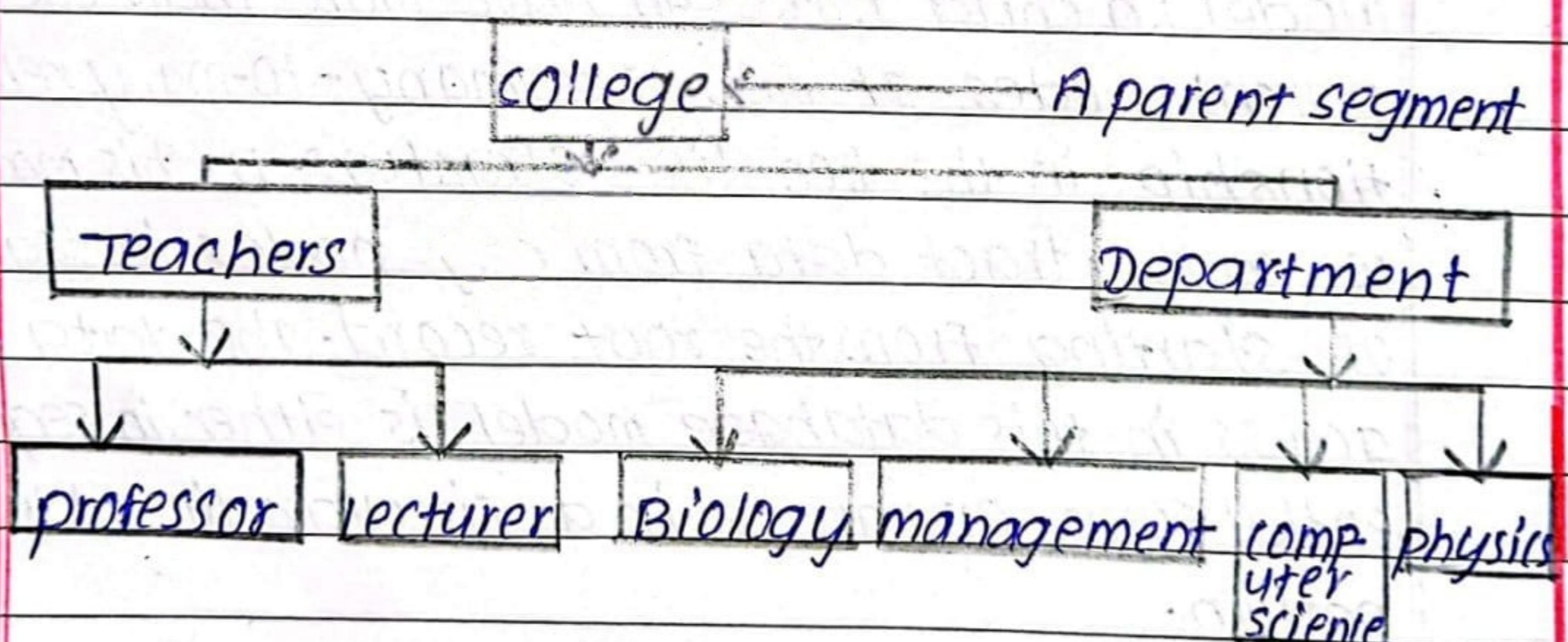


Figure: An example of hierarchical database model

Advantages:

1. It supports one-to-many relationships.
2. It is easy to add or delete information.
3. Searching is fast and easy as parent is known.

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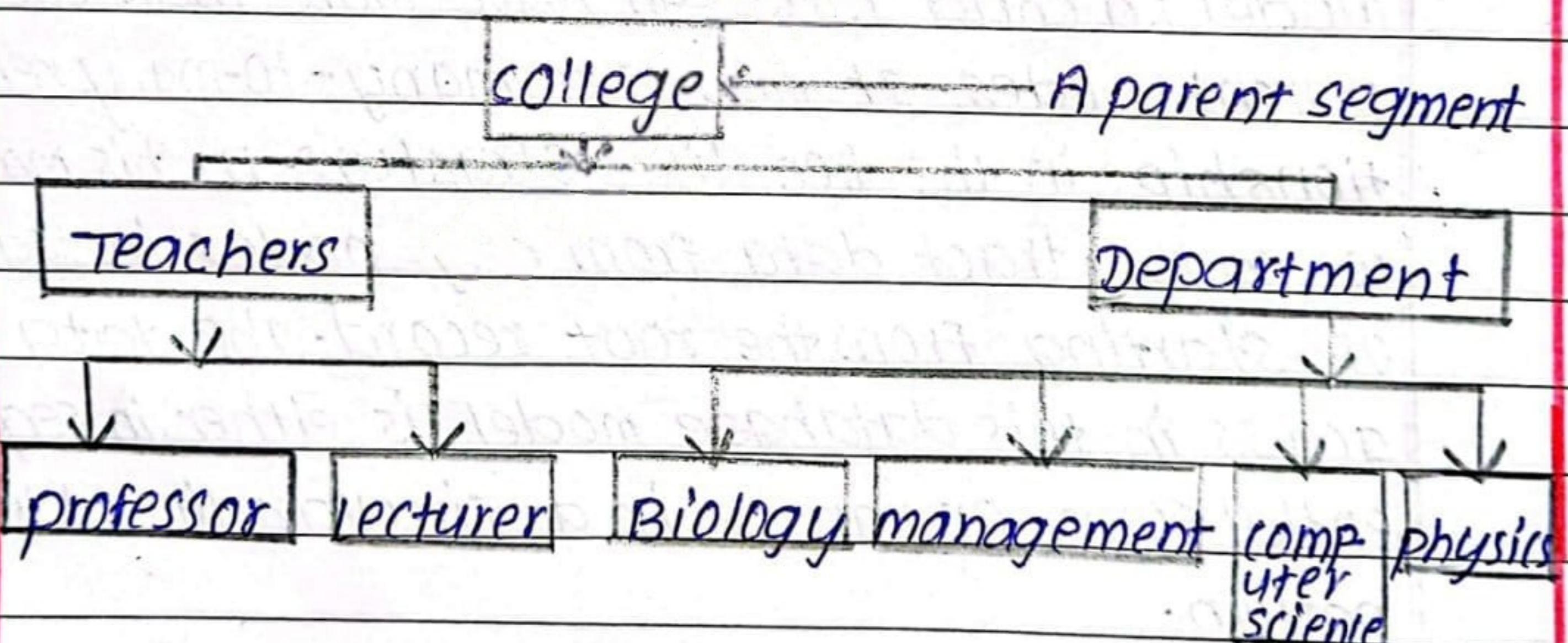


Figure: An example of hierarchical database model

Advantages:

1. It supports one-to-many relationships.
2. It is easy to add or delete information.
3. Searching is fast and easy as parent is known.

Disadvantages:

1. It is old fashioned, outdated database model.
2. It cannot handle many-to-many relationships.
3. When a parent node is deleted, all the children nodes are deleted automatically.

3. Explain Network Database model with example.

→ Network database model is a modified version of the hierarchical database model. In this model, a child node can have more than one parent nodes. It allows a many-to-many relationship in the tree like structure. In this model, we can extract data from any nodes instead of starting from the root record. The data access in this database model is either in sequential form or can be in a circular linked list pattern.

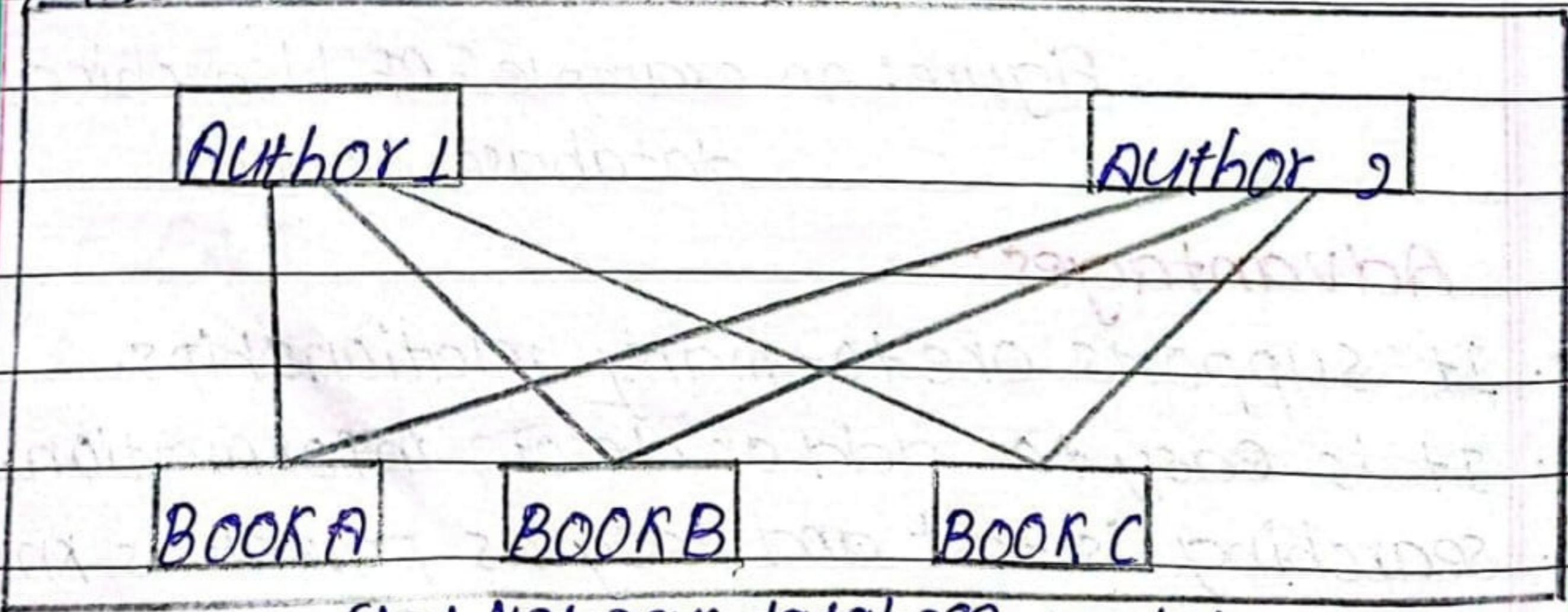


fig: Network database model

Advantages :

1. It is more flexible than hierarchical database model.
2. It supports many-to-many relationships.
3. Searching is faster because of multidirectional pointers.

Disadvantages :

1. It is one of the complex database models.
2. It is less secure than hierarchical database model.
3. Data redundancy is higher in this model.

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4. Explain Relational Database model with example.

→ In a relational database, the data are organized in the form of tables with rows and columns. Each table column represent field name and each row represents a record. A record is also known as a tuple. The data in one table is related to a data in another table with a common field.

Employer

ID	Name	Contact	Address
1.	pawan Rai	9850000000	Biratnagar
2.	prapti Baigain	9820000000	Salakpur
3.	Kalpana Chapagain	9810000000	Gothgaun
4.	Ramala Dahal	9860000000	Itahari
5.	kumar Karki	9870000000	Belbari

Figure: an example of relational database

Advantages:

1. Normalization of the database is possible.
2. It is very easier for sorting and searching the record.
3. It reduces data redundancy

Disadvantages:

1. It is more complex than other models.
2. It is not user friendly because it contains too many rules.
3. Data integrity is not ensured without normalization.

5. What is Normalization? Explain 1NF, 2NF and 3NF with example.

→ Normalization is the process of breaking a big table into much smaller and simplest tables.

1. First Normal Form (1NF): A relation or table is said to be in 1NF if its all attributes are atomic. That is, there should not be any repeating groups of an attribute.

Table: student

ROLL-NO	NAME	CLASS	SUBJECT	MARKS
15	Ram	XI	English	50
			Math	95
			Nepali	60
12	Hari	XII	English	52
			Computer	70
			Ar. Accountancy	85

Un-normalized table

Table: student

ROLL-no	NAME	CLASS	SUBJECT	MARKS
15	Ram	XI	English	50
15	Ram	XI	Math	95
15	Ram	XI	Nepali	60
12	Hari	XII	English	52
12	Hari	XII	Computer	70
12	Hari	XII	Accountancy	85

INF normalized table

2. Second Normal Form (2NF) : A relation is said to be 2NF if it is in INF and each attributes is functionally dependent on the entire primary key. The purpose of 2NF is to eliminate partial key dependencies.

Table 1: student

NAME	ROLL-no	CLASS
Ram	15	XI
Hari	12	XII

Table 2: subjects

SUBJECT	CLASS
English	XI
Math	XI
Nepali	XI
English	XII

Date :

Page :

computer

XII

Accountancy

XII

Table 3: Marks

Name	Subject	Marks
Ram	English	50
Ram	Math	95
Ram	Nepali	60
Hari	English	52
Hari	Computer	70
Hari	Accountancy	85

3. Third Normal Form (3NF) : A relation is said to be in third normal form if it is in second normal form and if it does not contain any transitive dependency on the primary key.

The above table can be presented in 3NF as below :-

Table 1: student

Student-ID	Name	ROLL-NO	CLASS-ID
1	Ram	15	11
2	Hari	12	12

Table 2 : students subject

Subject_ID	subject
101	english
102	Math
103	NEPALI
201	English
202	computer
203	ACCOUNTANCY

Table 3 : MARKS

Student_ID	subject_ID	Marks
1	101	50
1	102	95
1	103	60
2	201	52
2	202	70
2	203	85

Table 4 : CLASS

CLASS_ID	CLASS
XI	XI
XII	XII

6. Demonstrate primary key and alternate key with example.



Candidate key

All attributes combinations inside a relation that can be used to uniquely identify required record are candidate keys. A relation can have multiple candidate key.

Primary key

Primary key is a candidate key chosen by a database designer to identify the entity from the entity set. It uniquely identifies the all records of table. Although several candidate keys may exist, one of the candidate key which is selected be the primary key.

Alternate key

In the case of two or more candidate keys, only one of them servers as primary key. An alternate key is the candidate key which is not used as the primary key.

for eg.

Student(student_id, name, roll_no, class_id)

In the above example, Student is the entity and student-id, name, Roll-no and class-id are the attributes. If we see the attributes student-id, Roll-no and class-id, all of them can uniquely identify the record that's why all of them are candidate key. Only one of them can be the primary key in the table so its choose student-id as a primary key and the remaining attributes Roll-no and class-id are the alternate key.

5. Explain the different types of Data integrity in DBMS.

→ Data integrity is a rule that restricts the values that may be present in the database. Data integrity ensures that changes made to the database by authorized users do not result in a loss of data consistency.

The different types of data integrity are:

- a. Entity integrity: Entity integrity is the rule that no column that is part of the primary key may accept null values. Entity integrity prevents the primary key from accepting null values and ensures that one record can

be distinguished from another.

- b. Referential integrity: The referential integrity rule states that if table A contains a foreign key that matches the primary key of table B, then values of this foreign key either must match the value of the primary key for some row in table B or must be null.
- c. Domain integrity: Domain constraints specify the set of possible values that may be associated with an attribute. Such constraint may also allow the use of null values for particular attributes.

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6. What is database security? List and explain the data security measures.

→ Database security means not only protecting and securing a database but also providing data to authorized person. The database security ensures the confidentiality, integrity, and availability of the data. For example, the personal information of employees should be accessed only by the concerned authorities, not by everyone.

Some of the database security measures that provide security to data in databases are:

a. **Authentication:** Database authentication is the process of confirming whether a person has the right to access a database or not. It verifies the user's login credentials with the database and allows a user to access the database only when the login credentials match with the database.

b. **Database Encryption:** It is a security measure where a sender encrypts the information into ciphertext (i.e. unreadable format) and the receiver decrypts the ciphertext and gets the original content. It helps a user to protect sensitive data from cyber-attacks.

c. **Backup Database**: A backup database allows a user to restore data in the case of data loss, data corruption, hacking or natural disasters. Making a copy of the database is a data backup.

d. **Antivirus**: ^{use of} The antivirus software ^{is to} protects computer systems from computer viruses. It protects database, applications, etc. from being damaged or lost.

e. **Physical Security**: physical database security is the protection of the database server room from unauthorized access. A database server should be located in a secure and climate-controlled environment in a building.

7. What is centralized database? write its advantages and disadvantages.

→ A centralized database is a database located in a single location on single computer.

Advantages

- Since all data is stored at a single location, it is easier to access and manipulate data.
- It provides easier database administration.
- There is a high level of data integrity in the centralized database.
- Centralized database is more secure.

Disadvantages

- There is high data traffic in a centralized database if there are more end-user.
- If any kind of system failure occurs at the centralized system, then the entire database will be destroyed.

8. what is decentralized database? write its advantages and disadvantages.

→ In a decentralized database model or distributed database model, the database is stored on several computers. Decentralized database is located at different places.

Advantages

- Failure of a site doesn't affect the whole computer system.
- It is much reliable as compared to the centralized database system.
- The performance and service are better than centralized database system.
- It is suitable for a big organization with a large amount of data, database users and computers.
- Due to the use of multiple servers, it can supports a large numbers of users and computers at the same time.

Disadvantages

- This database is very costly and it is difficult to maintain because of its complexity.
- In this database, it is difficult to provide a uniform view to user since, it is spread across different physical locations.
- There may be the problem of data integrity.

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9. Distinguish between centralized database and decentralized database.

→ centralized database

1. It is located in a single location.

2. It is cheap to establish.

3. It is easy for maintenance.

4. It is appropriate for small organization.

5. It is more secure.

6. If a server fails, entire system will not work.

7. For eg:- NIC asia bank, numario bank etc.

decentralized database

It is located in multiple location.

It is expensive to establish.

It is hard for maintenance.

It is appropriate for large organization.

It is less secure.

If one server fails, all the systems are backed up by another server.

For eg:- youtube, facebook, etc.