DBMS (Database Management System)

Definition :- Database is collection of related information stored so that it is available to many users for different purpose. The content of a database is obtained by combining data from all the different sources in an organization.

- **Data :-** Data can be define as a representation of facts and instructions in a formalized manner suitable for communication or processing by human or electronic machine. Data is represented with the help of characters like alphabets (A to Z & a to z), digits (0-9), special characters (+, =, <, >, etc.).
- **Data items (Field) :-** A set of characters which are used together to represent a specific data element. For e.g. name of a student in a class is represented by the data item, say NAME.
- **Record :-** Record is a collection of related data items. For e.g. payroll record for an employee contains such data fields as name, age, qualification, gender, basic pay, DA (Dearness Allowance), HRA (House Rent Allowance), PF (Provident Fund) etc.
- **File :-** File is collection of related records. For e.g. A payroll file might consist of the employee pay record for a company.

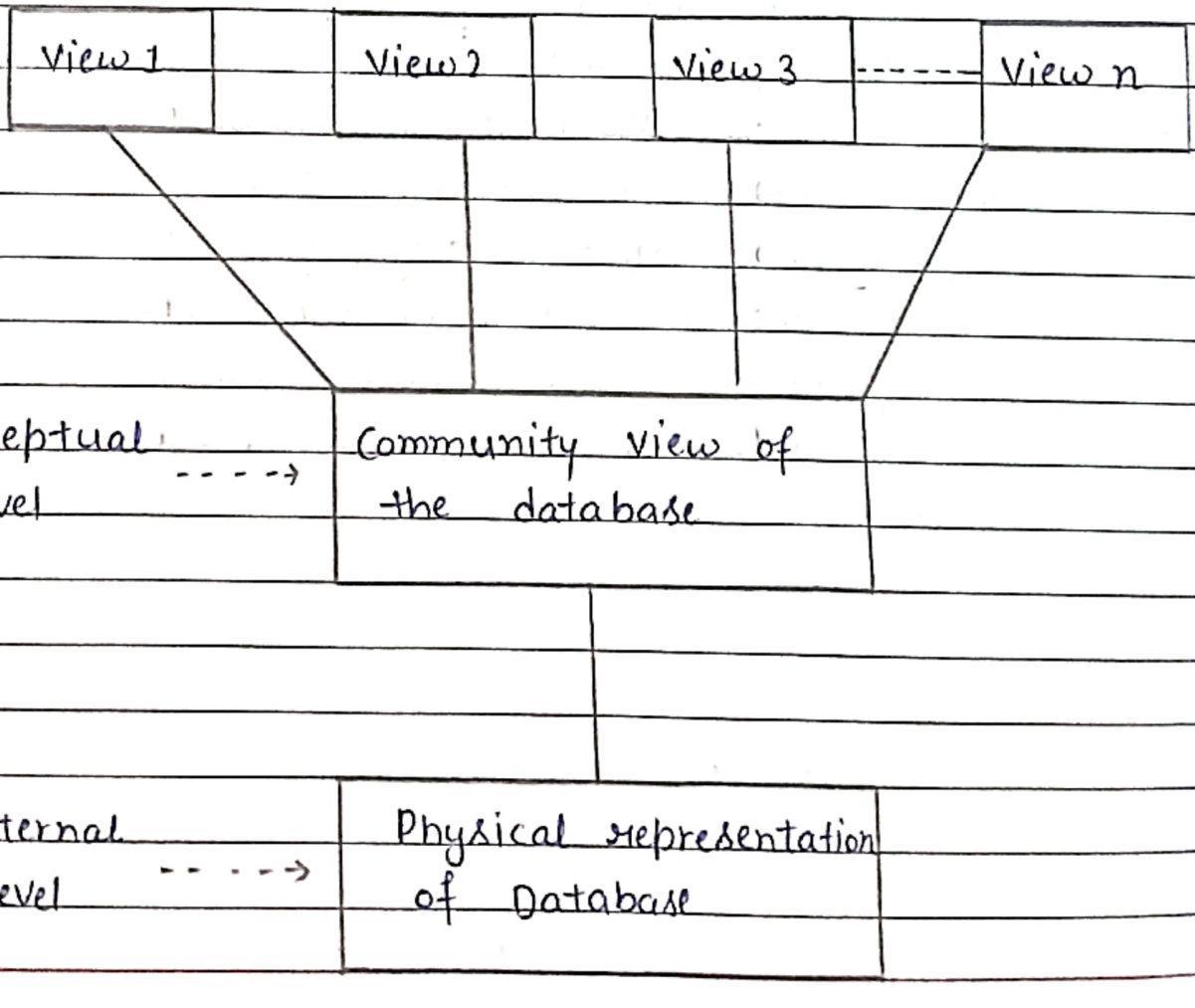
Student File

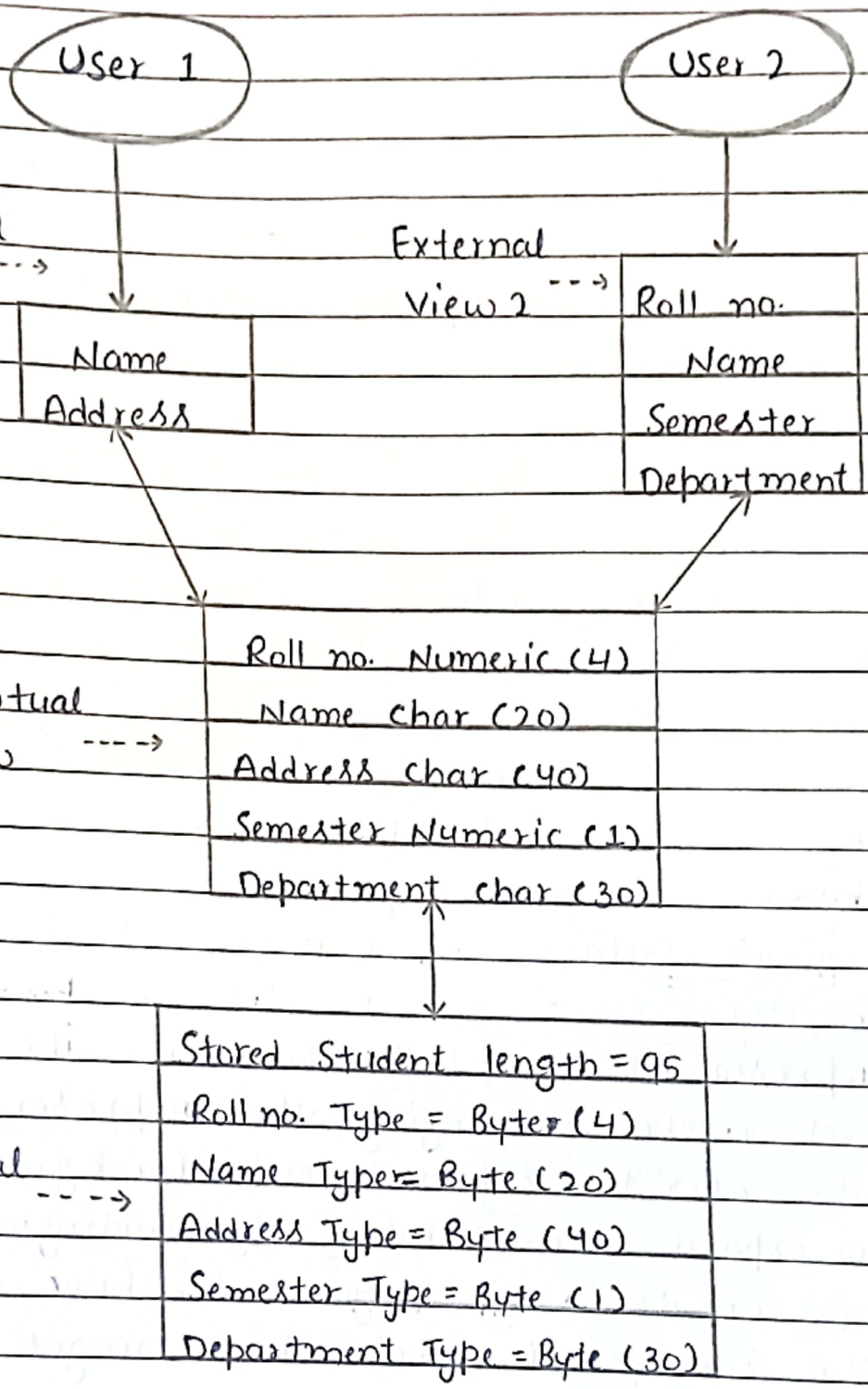
Roll no.	Name	Marks	----> Data
1001	Amrit	85	----> Record
1002	Ritu	88	
1003	Aman	50	

Characteristics of DBMS :-

1. A database represents some aspects of the real-world application. For e.g. consider the students database, maintaining records of attendance, unit examination marks, scholarship etc. related to each student of the college.
2. A database is designed and built with data for a specific purpose.
3. Operations like update, insert, retrieve etc. on the database can be carried out in a simple and flexible way.
4. A database provides a logical relational between its records and data.

Three Schema Architecture :-





- Internal level :- The internal level of database specifies the way in which the data is physically stored in the database. The internal or physical level of database system architecture also provide description the relationship the exit between the data.
- External level :- The external level of the database specifies the way in which the data,

stored in the database is viewed by the users.

- Conceptual Level :- The conceptual Level specifies the level of interaction between the internal and the external level of system architecture.

Data Independance :- DBMS architecture can be used to explain the concept of data independence which is the ability to change the representation of the data at the one level of a database system.
There are two types of the data independence.

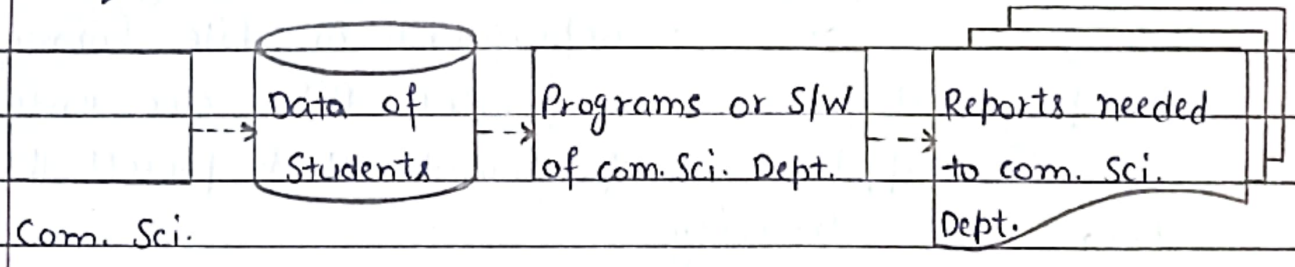
1. Logical Data Independence.
2. Physical Data Independence.

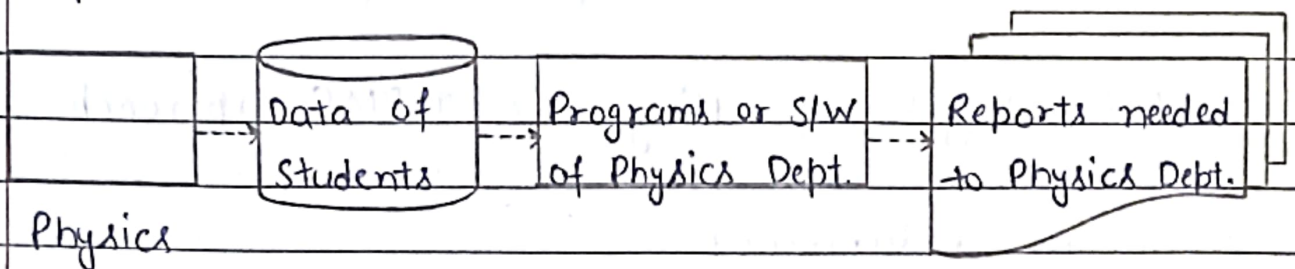
1. Logical Data Independance :- It is the ability to ~~two~~ change the representation of the data at the conceptual level without changing the representation of data at the external level. For e.g. if you want to expand the database by adding a record type or data type, you will have to change the conceptual level. The changes in the conceptual level can be made accordingly and the external level the refers to the remaining data need not to be change.
2. Physical Data Independence :- It is the ability to change the representation of data at the internal level without changing the representation of the data at the conceptual or external level. Change to the internal level may be

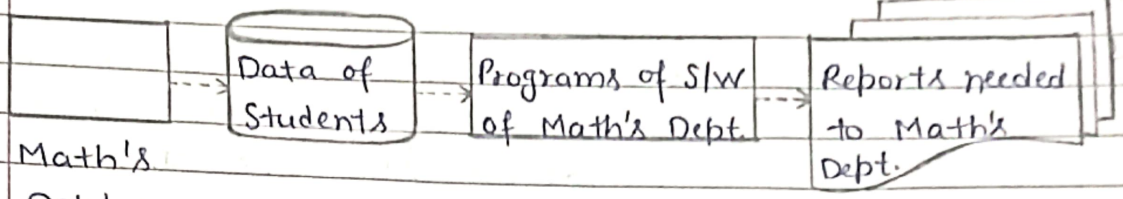
needed, if some physical files are to be recognized for e.g. if you want to improve the performance of retrieval or update a database you may need to create additional access structure. This may result in file reorganization. If the data store in the database does not change, you will not have to change to conceptual Level.

Traditional File Environment System

Advantages :- The earlier business computer system for use to process business record ₱ and produce an information. They were generally faster and more accurate than equivalent manual systems. These system stored groups of records in separate files and so they were called file processing system. In a typical file processing system, each department has its own files designed specific for those applications. For e.g. Suppose a student got admission in B.Sc.1 (Computer Science) in traditional file system, data of student required to be entered in three places.







Disadvantages :-

1. Duplicate Data :- All the files are independent of each other some fields are store in more than one files.
2. Inconsistency :- In file processing system, data is not consistent. If a data item is to be changed then all the files containing that data need to be updated.
3. Poor Data Integrity :- A collection of data has integrity if data is logically consistent that is the duplicate data item agree with one another.
4. Data is isolated and separated.
5. Application Programs :- Application programs are dependent on file format. The physical format of the file are entered in the application programs that process the file.
6. Poor data security
7. Wastage of labor space.

Advantages of using the DBMS approach

1. Control Redundancy

In the file processing approach, each users defines and implement the files needed and software

application to manipulate those files.

Data redundancy leads to wasted storage space, duplication of efforts.

2. Multiple user interface

DBMS provides a variety of user interface for the users of varying level of technical knowledge.

These includes query language for casual users, programming language and natural language interfaces for stand-alone users etc.

3. Providing backup and recovery

If hardware or software f in the update programe, the recovery subsystem of DBMS ensures that update is resumed at the point of failure.

4. Restricting authorized access

A DBMS provides a security and authorization sub-system which is used by DBA (Database Administrator) to create user accounts to specifies restrictions on user accounts.

5. Providing persistent storage for program objects

Object oriented database system is compatible with programming language such as c++ and java.

6. Providing storage structures of efficient query processing

#. The DBMS utilizes a variety of sophistricated techniques (view, index etc.) to store and retrieve the data efficiently that are utilized to improve the execution of time of queries an updated.

7. Representing complex relationships among data.

A DBMS must have the capability to represent a variety of complex relationship among the data, to define new relationship as they arise and to retrieve and update the related data easily and efficiently.