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Module of computer science 2

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DATABASE CONCEPTS

Learning Outcomes :

- Student will be able to understand the conceptual design of database
- Student will be able to describe the important of good database design
- Student will be able to apply database design for a real business

Introduction:

Databases are very important in daily life (They are the wealth for many organizations.).They can be very large dimension (Terabyte), those data are stored in a structured form and manipulated according specific way.

1. What is data?

• Data is a collection of facts, numbers, letters or symbols that the computer process into meaningful information.

2. What is Information?

• Information is processed data, stored, or transmitted by a computer.

3. What is Database?

• A Database is a collection of logically related data organized in a way that data can be easily accessed, managed and updated.

4. What is a field?

• Each column is identified by a distinct header called attribute or filed.

5. What is a record?

• A single entry in a table is called a record or row. A record in a table represents set of related data. Records are also called the tuple.

6. What is an entity?

• An **Entity** can be any object, place, person or class.

7. What is an instance?

• The collection of information stored in the database at a particular moment is called an instance of the database**.**

8. What is an attribute?

• It is defined as a named column of a relation. An **Attribute** describes a property or characteristic of an entity.

• Ex: In STUDENT table, Name, Age, Class, Combination and Marks.

9. What is domain?

• It is defined as a set of allowed values for one or more attributes.

10. What is a relation?

• A relation is defined as a table with columns and rows. Data can be stored in the form of a two dimensional table.

11. What is a table?

• A table is a collection of data elements organized in terms of rows and columns. Table is the simplest form of data storage.

12. What is normalization?

• Normalization is a step by step process of removing the different kinds of redundancy and anomaly one step at a time from the database.

13. What is a key?

• It is a column or columns which identifies the each row or tuple.

Classify the various types of keys used in database:

The different types of keys are:

✓ **Primary key:**

• It is a field in a table which uniquely identifies each row/record in a database table.
• Primary keys must contain unique values.
• A primary key column cannot have NULL values.
• Ex: In Relation **STUDENT**, Regno serves as a primary key.

✓ **Candidate Key:**

• When more than one or group of attributes serve as a unique identifier, they are each called as candidate key.

✓ **Alternate Key**

• The alternate key of any table are those candidate keys which are not currently selected as the primary key.
• This is also known as **secondary key**.

✓ **Foreign key**

• A key used to link two tables together is called a foreign key.
• This is sometimes called a referencing key.
• Foreign key is a field that matches the primary key column of another table.

14. Mention the applications of database:

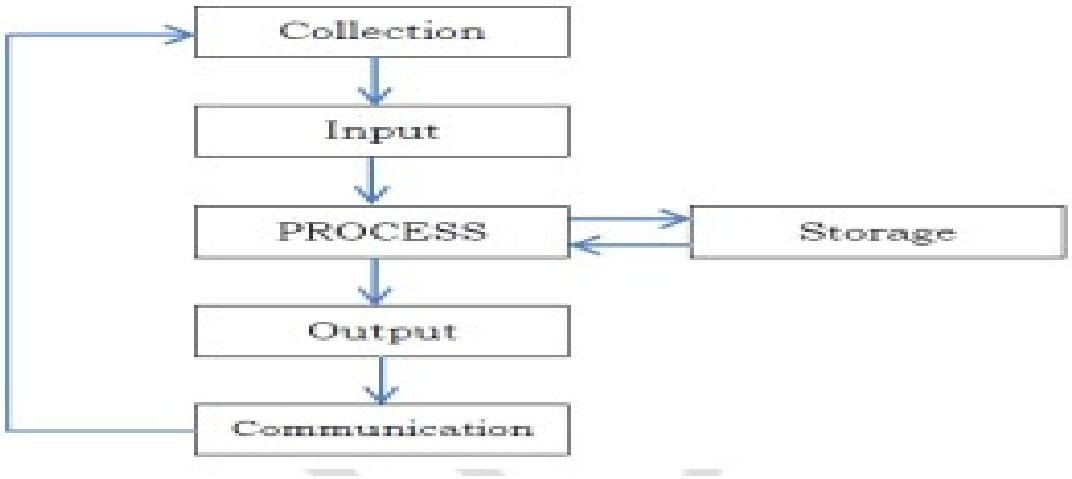
• **Banking**: For customer information, accounts and loans, and banking transactions.
• **Colleges**: For student information, course registrations and grades.
• **Credit card transactions**: For purchases on credit cards and generation of monthly statements.
• **Finance**: For storing information about holdings, sales and purchases of financial instruments such as stocks and bonds.

• **Sales**: For customer, product, and purchase information.
• **Telecommunication**: For keeping records of call made, generating monthly bills, maintaining balance on prepaid calling cards, and storing information about the communication networks.

15. Explain Data processing cycle:

• **Data Collection:** It is the process of systematic gathering of data from various sources that has been systematically observed, recorded and organized.
• **Data Input:** The raw data is put into the computer using a keyboard, mouse or other devices such as the scanner, microphone and the digital camera.
• **Data Processing:** Processing is the series of actions or operations on the input data to generate outputs.

• **Data storage:** Data and information should be stored in memory so that it can be accessed later.
• **Output:** The result obtained after processing the data must be presented to the user in user understandable form. The output can be generated in the form of report as hard copy or soft copy.
• **Communication:** Computers now-adays have communication ability which increases their power.

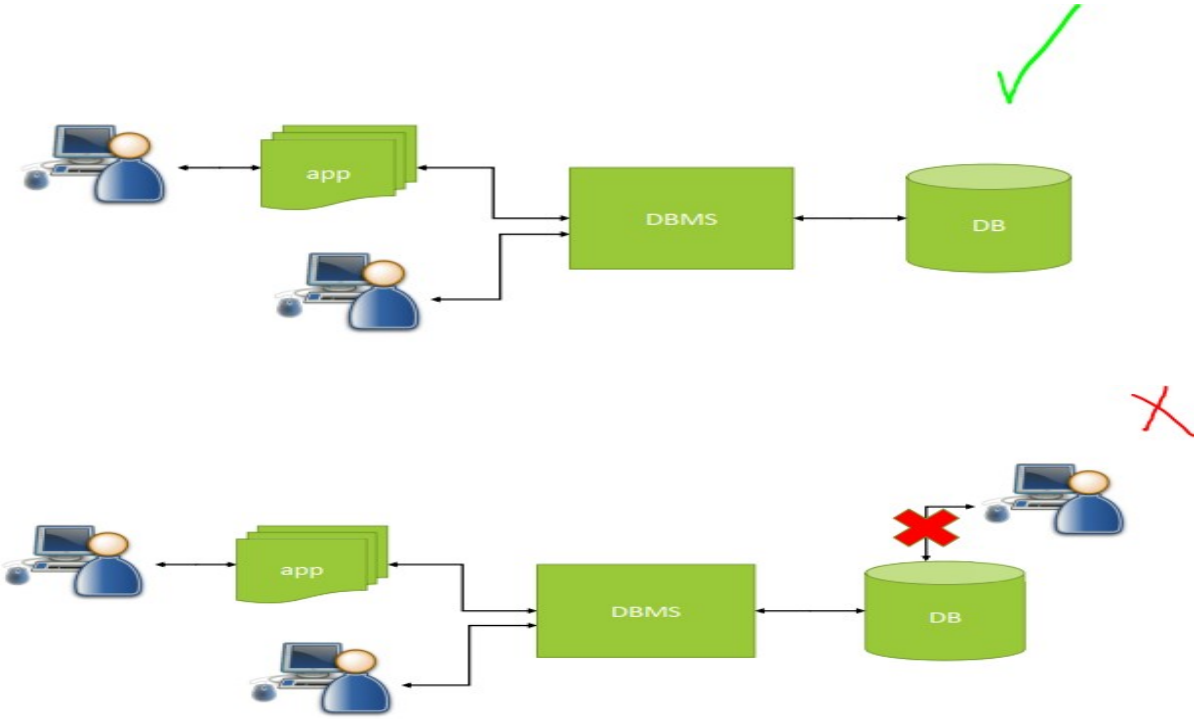


16. Explain the features or advantages of Database:

• **Redundancy can be minimized or controlled**: In DBMS environment if redundancy is present, then it can be controlled by propagating updates in all the places where ever redundant data is present.
• **Data Integrity**: Data Integrity refers to the correctness of the data in the database. In other words, the data available in the database is reliable data.
• **Data Sharing**: In DBMS, data is stored in the centralized database and all the permitted users can access the same piece of information required at the same time.

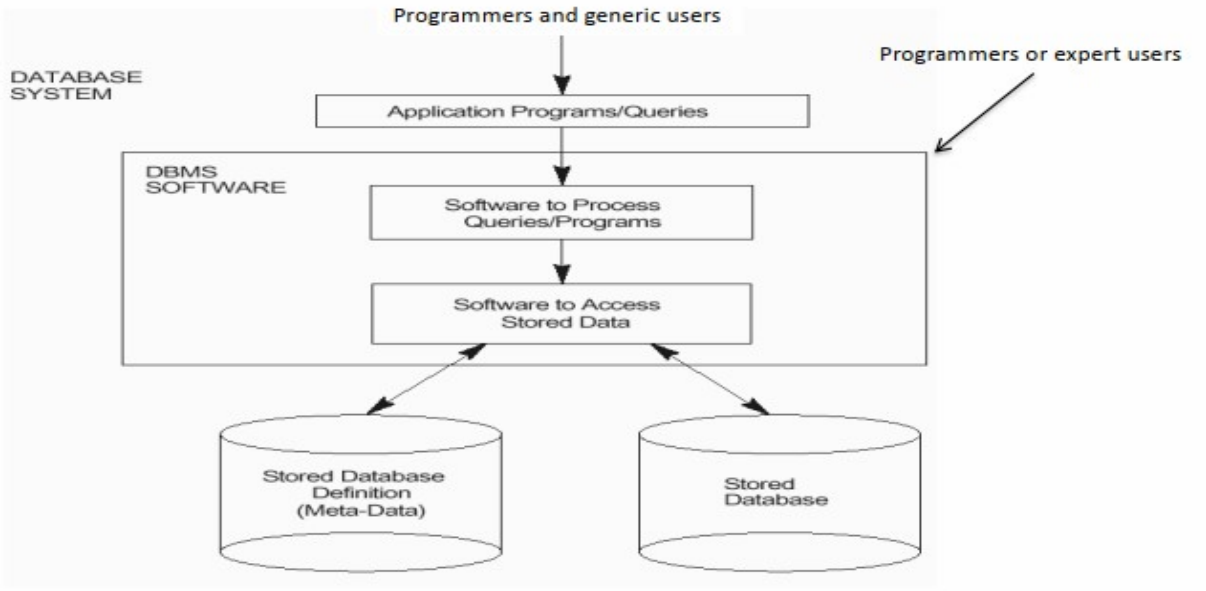
• **Database Security**: DBMS provides a variety of security mechanisms for the user to protect his or her data stored in the database.
• **Supports Concurrent access**: DBMS supports concurrent access to the same data stored in the database by applying locking and time stamp mechanisms.

17. Typical Database Application Architecture :

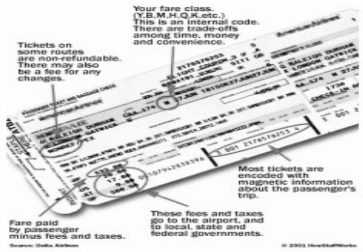


- **Database management system (DBMS)** : is the software used to interact between the database and an application that uses the database such as Access, that stores, retrieves, arranges, and formats information contained in a database. Than controls that information.
- Examples: Oracle ,DB2 (IBM) ,MS SQL Server ,MS Access ,Ingres ,PostgreSQL ,MySQL .

Database System:



Examples of data bases :



Example: Students take courses

Id	Name	Course	CourseID	Department
1.	Jack	Mathematics	M-1	Math
4.	Jack	Chemistry	C-1	Chemistry
2.	Tim	Chemistry	C-1	Chemistry
3.	Ana	Physics	P-1	Physics
5.	Ana	Chemistry	C-1	Chemistry

References:

1. Keerthi Kumar H M, Chapter 13- Database Concepts, II PUC, MDRPUC, Hassan,15,2015.