Database system

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Introduction to Database Concepts

Data and Information

- **Data :**

It is raw, unorganized facts that need to be processed. Data can be something simple and seemingly random and useless until it is organized.

Example: Each student's test score is one piece of data.

- **Information:**

When data is processed, organized, structured or presented in a given context so as to make it useful, it is called information.

Example: The average score of a class or of the entire school is information that can be derived from the given data.

Data

- Data is collection of facts
- Data is unorganized.
- Data does not depend on information
- Data isn't sufficient for decision making

Information

- Information puts facts into context
- Information is organized
- Information depends on data
- Information is sufficient for decision making

Definition of database

A Database is a collection of related data and data is a collection of facts and figures that can be processed to produce information.

- Mostly data represents recordable facts for examples:

✓Bank needs to store the information relating to customer accounts

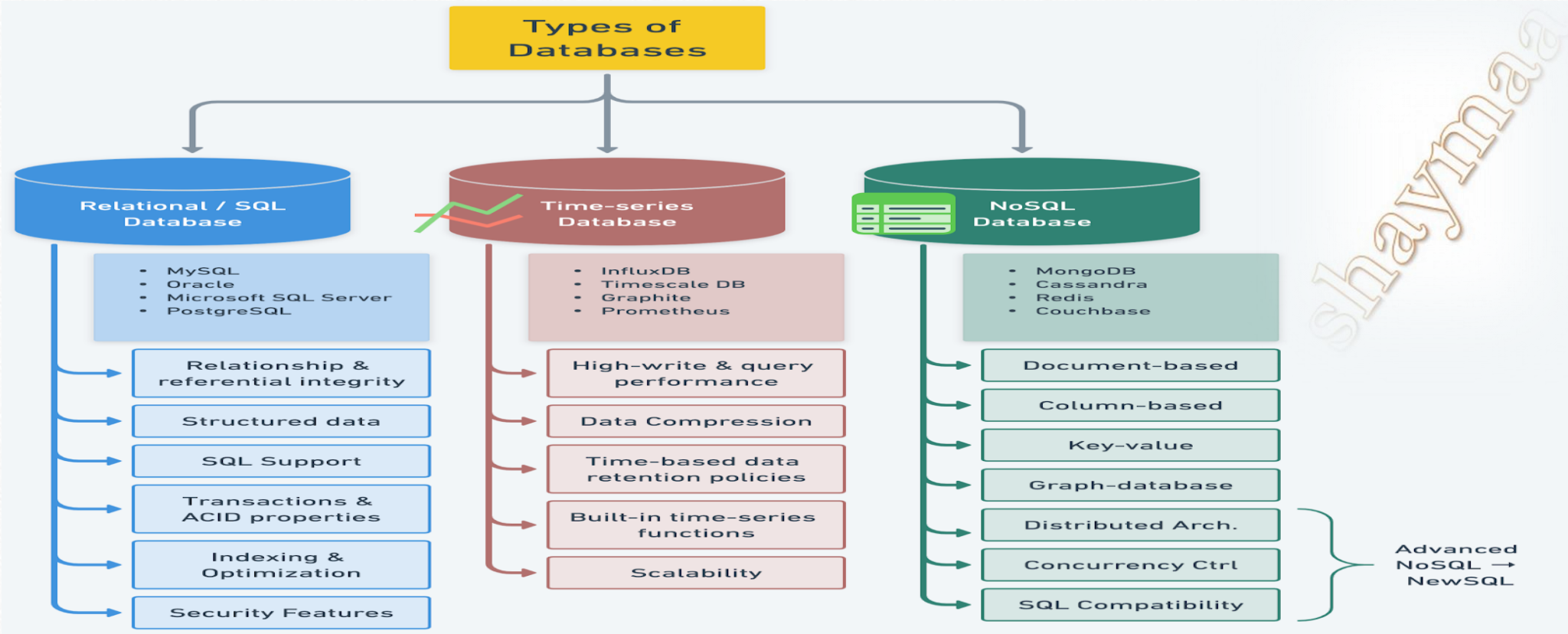
✓Hospital needs to keep data about patients and the medication dispensed,

✓University needs to maintain record of its students,

✓Internet sales business needs toTraffic log for future forensic analysis.

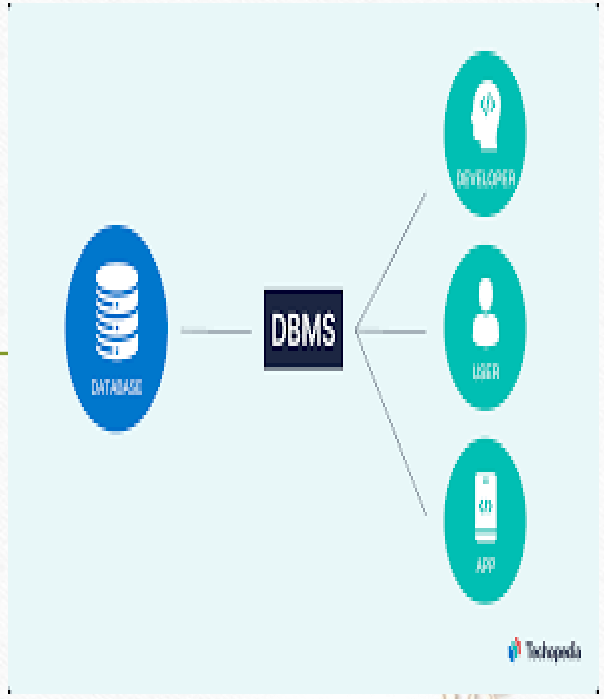
A database management system stores data in such a way that it becomes easier to retrieve, manipulate, and produce information.

Database Types



Database Management System (DBMS)

A **DBMS** is a collection of programs provided by the vendor, which enable the data to be accessed, filtered and generally processed efficiently, in order to yield useful information for the user.



- Database Management System applications like **MySql,** Oracle, etc. are immensely used in businesses to model and manage business objects within corporate databases.
- They provide lots of advantages to enable organizations to keep their business records secured, consistent and relevant.

Database Management System (DBMS)

A modern DBMS has the following characteristics:

1. Real-world entity

A modern DBMS is more realistic and uses real-world entities to design its architecture. It uses the behavior and attributes too. For example, a school database may use students as an entity and their age as an attribute.

2. Relation-based tables

DBMS allows entities and relations among them to form tables. A user can understand the architecture of a database just by looking at the table names.

3. Isolation of data and application

A database system is entirely different than its data. A database is an active entity, whereas data is said to be passive, on which the database works and organizes. DBMS also stores metadata, which is data about data, to ease its own process.

4. Less redundancy

DBMS follows the rules of normalization, which splits a relation when any of its attributes is having redundancy in values. Normalization is a mathematically rich and scientific process that reduces data redundancy.

5. Consistency

Consistency is a state where every relation in a database remains consistent. There exist methods and techniques, which can detect attempt of leaving database in inconsistent state. A DBMS can provide greater consistency as compared to earlier forms of data storing applications like file-processing systems.

6. Multiuser and Concurrent Access

DBMS supports multi-user environment and allows them to access and manipulate data in parallel. Though there are restrictions on transactions when users attempt to handle the same data item, but users are always unaware of them.

7. Multiple views

DBMS offers multiple views for different users. A user who is in the Sales department will have a different view of database than a person working in the Production department. This feature enables the users to have a concentrate view of the database according to their requirements.

8. Security

Features like multiple views offer security to some extent where users are unable to access data of other users and departments. DBMS offers methods to impose constraints while entering data into the database and retrieving the same at a later stage.

Advantages of a DBMS

1- Database Development:

It allows organizations to place control of database development in the hands of database administrators (DBAs) and other specialists.

2-Data independence:

Application programs should be as independent as possible from details of data representation and storage.

3-Efficient data access:

A DBMS utilizes a variety of sophisticated techniques to store and retrieve data efficiently. It allows different user application programs to easily access the same database.

4-Crash recovery:

The DBMS protects users from the effects of system failures

5- Data integrity and security:

If data is always accessed through the DBMS, the DBMS can enforce the integrity constraints on the data. For example, before inserting salary information for an employee, the DBMS can check that the department budget is not exceeded.

6- Data administration and Concurrent access:

When several users share the data(more than one user access the database at the same time), DBMS schedules concurrent accesses to the data in such a manner that users can think of the data as being accessed by only one user at a time.