A Study On
Data Base -
Management Systems

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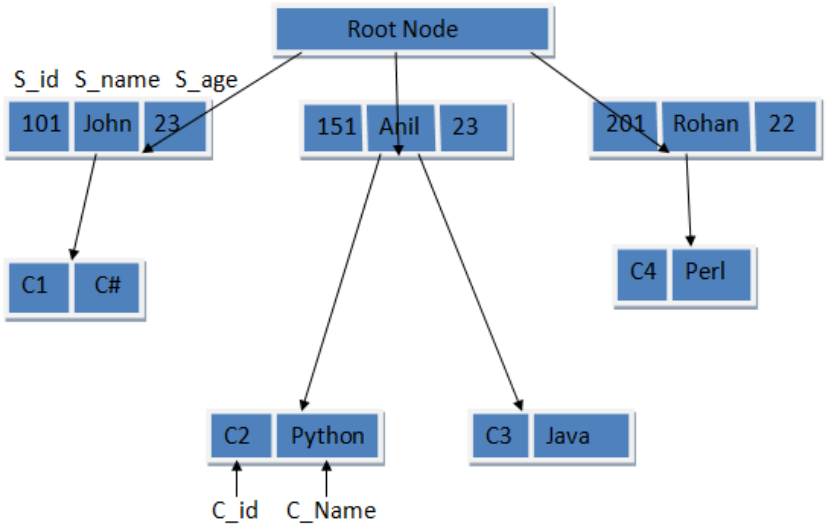
Examples of DBMS Systems:

1.Hierarchical Database:

A hierarchical database model is a data model in which the data are organized into a tree-like structure. The data are stored as records which are connected to one another through links. A record is a collection of fields, with each field containing only one value. The type of a record defines which fields the record contains.

The hierarchical database model mandates that each child record has only one parent, whereas each parent record can have one or more child records. In order to retrieve data from a hierarchical database, the whole tree needs to be traversed starting from the root node. This model is recognized as the first database model created by IBM in the 1960s.



*Advantages:

The key advantage of a hierarchical database is its ease of use. The one-to-many organization of data makes traversing the database simple and fast, which is ideal for use cases such as website drop-down menus or computer folders in systems like Microsoft Windows OS.

*Disadvantages:

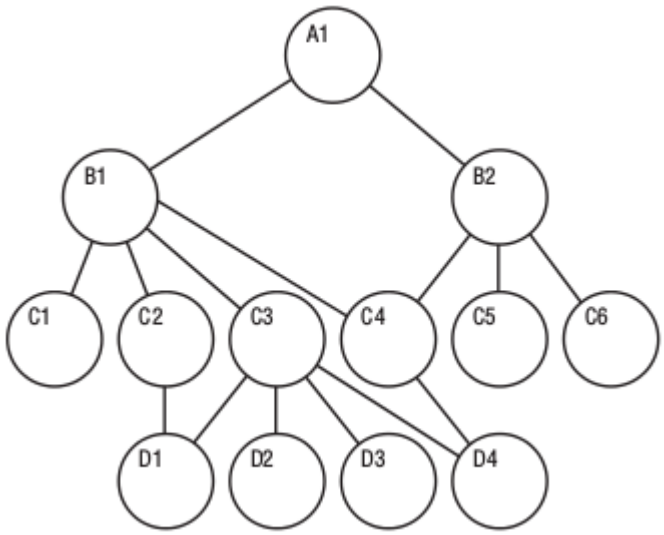
The major disadvantage of hierarchical databases is their inflexible nature. The one-to-many structure is not ideal for complex structures as it cannot describe relationships in which each child node has multiple parents nodes.

2.**Network databases:**

A network database is a type of database model wherein multiple member records or files can be linked to multiple owner files and vice versa. The model can be viewed as an upside-down tree where each member information is the branch linked to the owner, which is the bottom of the tree. Essentially, relationships are in a net-like form where a single element can point to multiple data elements and can itself be pointed to by multiple data elements.

In summary the network database model is similar but different then the hierarchal database model. The network database model should be used when it is necessary to have a flexible way of representing objects and their relationships.

The network database model uses a data management language that defines data characteristics and the data structure in order to manipulate the data.



*Advantages:

There are a few advantages and disadvantages of using the network database model. Some advantages include conceptual simplicity, data access flexibility, conformance to standards, handle more relationship types, promote database integrity, and allows for data independence.

*Disadvantages:

The disadvantages of the network database model are the structure is difficult to change, this type of system is very complex, and there is a lack of structural independence.

3.Relational Database:

A relational database management system (RDBMS) is a system where data is organized in two-dimensional tables using rows and columns.

This is one of the most popular data models which is used in industries. It is based on SQL.

*What is a relational database?

A relational database is a collection of information that organizes data points with defined relationships for easy access. In the relational database model, the data structures -- including data tables, indexes and views -- remain separate from the physical storage structures, enabling database administrators to edit the physical data storage without affecting the logical data structure.

In the enterprise, relational databases are used to organize data and identify relationships between key data points. They make it easy to sort and find information, which helps organizations make business decisions more efficiently and minimize costs. They work well with structured data.

* What is the structure of a relational database model?

E. F. Codd, then a young programmer at IBM, invented the relational database in 1970. In his paper, "A Relational Model of Data for Large Shared Data Banks," Codd proposed shifting from storing data in hierarchical or navigational structures to organizing data in tables containing rows and columns.

Each table, sometimes called a relation, in a relational database contains one or more data categories in columns or attributes. Each row, also called a record or tuple, contains a unique instance of data -- or key -- for the categories defined by the columns. Each table has a unique primary key that identifies the information in a table. The relationship between tables can be set via the use of foreign keys -- a field in a table that links to the primary key of another table.

*Advantages:

1.Categorizing data.

2.Accuracy.

3.Ease of use.

4.Collaboration.

*Disadvantages:

1.Structure.
2. Inflexibility.
3. Maintenance issues.
4. Lack of scalability.

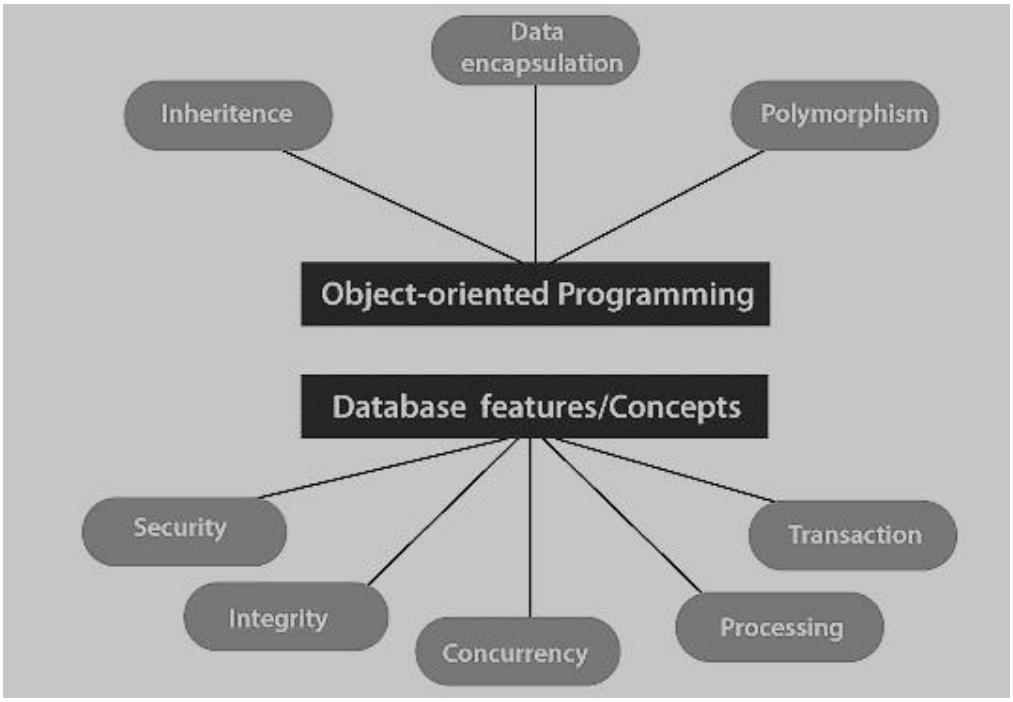
4.Object Oriented Database:

It is a system where information or data is represented in the form of objects which is used in object-oriented programming.

- It is a combination of relational database concepts and object-oriented principles.
- Relational database concepts are concurrency control, transactions, etc.
- OOPs principles are data encapsulation, inheritance, and polymorphism.
- It requires less code and is easy to maintain.

For example − Object DB software.

The object oriented database is represented in diagram format below −



*Advantages:

Easy to save and retrieve data quickly.

Seamless integration with object-oriented programming languages.

Easier to model the advanced real world problems.

Extensible with custom data types.

*Disadvantages:

Not as widely adopted as relational databases.

No universal data model. Lacks theoretical foundations and standards.

Does not support views.

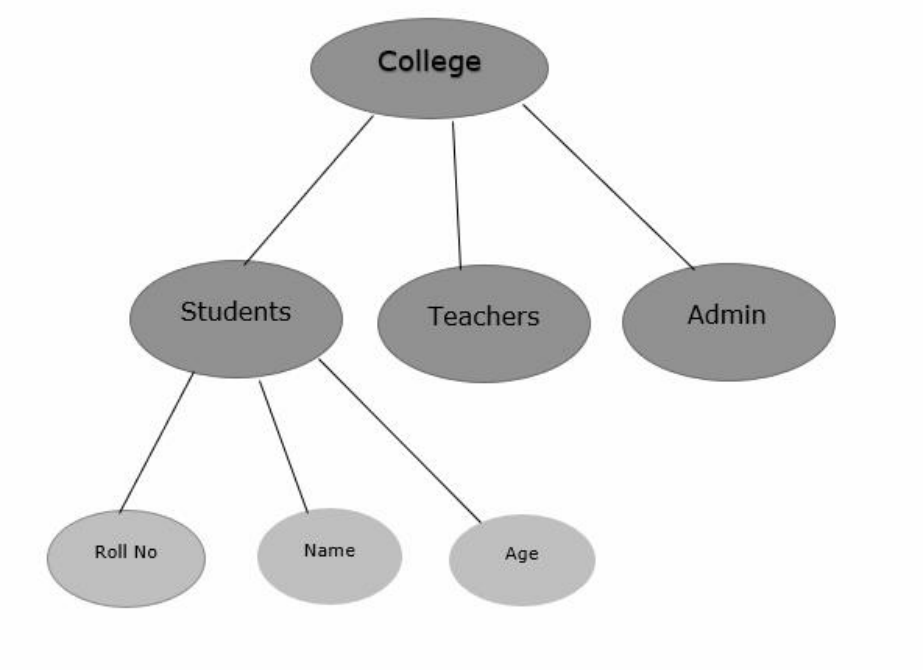
5.Hierarchical Database:

It is a system where the data elements have a one to many relationship (1: N). Here data is organized like a tree which is similar to a folder structure in your computer system.

- The hierarchy starts from the root node, connecting all the child nodes to the parent node.
- It is used in industry on mainframe platforms.

For example− IMS(IBM), Windows registry (Microsoft).

An example of a hierarchical database is given below −



*Advantages:

• Simple based on Hierarchal structure, the relationships between the layers (parents or child nodes).

• Data Security: the first database model that offered the data security that is provided by the DBMS.

*Disadvantages:

• Implementation complexity:

• Database Management Problem:

• Lack of Structural Independence:

• Rigid rules.

• Duplicate data.

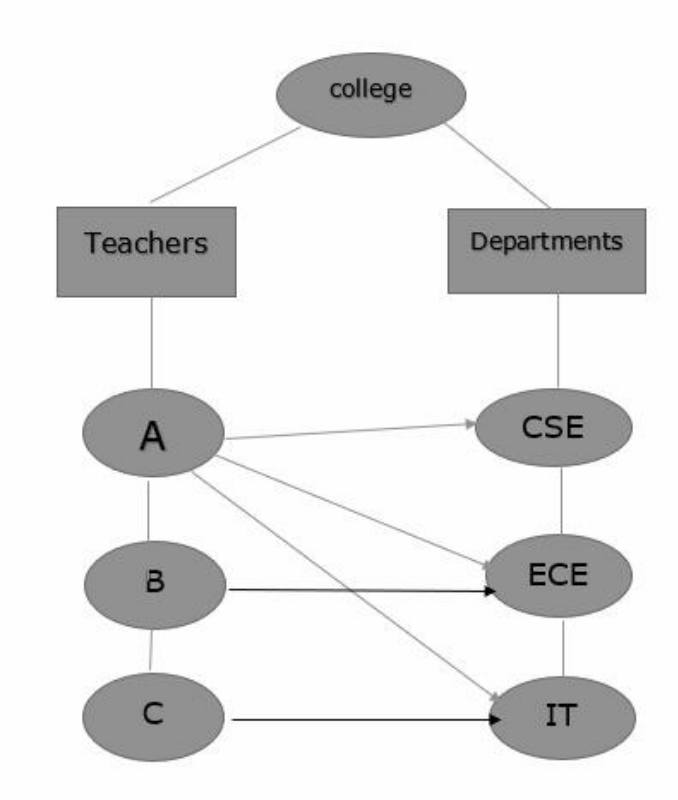
6.**Network database:**

A Network database management system is a system where the data elements maintain one to one relationship (1: 1) or many to many relationship (N: N).

It also has a hierarchical structure, but the data is organized like a graph and it is allowed to have more than one parent for one child record.

Example

Teachers can teach in multiple departments. This is shown below −



*__Advantages:__

In this model, we can access the data easily, and also there is a chance that the application can access the owner's and the member's records within a set.

This network does not allow a member to exist without an owner which leads to the concept of Data integrity.

*__Disadvantages:__

The design or the structure of this model is not user-friendly. This model does not have any scope of automated query optimization.

This model fails in achieving structural independence even though the network database model is capable of achieving data independence.

7.Distribution Database:

In comparison to the centralized database idea, there are inputs from the general database and the information collected from local computers. The data is not accessible in a single location and is distributed to various company sites. These sites are connected to each other through communication links that enable access to the data distributed.

A distributed database in which various parts of a database are located in different physical locations along with databases replicated and distributed between different points in a network can be imagined. Heterogeneous and homogenous are the two kinds of distribution database. Databases with the same base hardware and running on the same operating systems and applications are known as homogeneous DDBs. In different sites of the DDB defined as a heterogeneous DDB, operating systems, the underlying hardware and application procedures can be different.

*Advantages:

The database is easier to expand as it is already spread across multiple systems and it is not too complicated to add a system.

The distributed database can have the data arranged according to different levels of transparency i.e data with different transparency levels can be stored at different locations.

The database can be stored according to the departmental information in an organisation. In that case, it is easier for a organisational hierarchical access.

*Disadvantages of Distributed DBMS:

It is difficult to provide adequate security in distributed systems because the nodes as well as the connections need to be secured. Some messages and data can be lost in the network while moving from one node to another.

It is difficult to maintain data integrity in the distributed database because of its nature. There can also be data redundancy in the database as it is stored at multiple locations.

The distributed database is complicated and it is difficult to find people with the necessary experience who can manage and maintain it.

8.**Cloud Database**:

Now a day, data are actually stored in a public cloud, a hybrid cloud or a private cloud, also known as a virtual environment. A cloud database is an automated or built-in database for such a virtualized environment. A cloud service offers various advantages, including the ability to pay per user storage capacity and bandwidth and provides scalability on request, as well as high availability. In addition, a cloud platform allows companies to support enterprise applications in the delivery of software as a service.

A cloud database is a database service built and accessed through a cloud platform. It serves many of the same functions as a traditional database with the added flexibility of cloud computing. Users install software on a cloud infrastructure to implement the database.

Well, that's the advantages and disadvantages of using Cloud Computing services. Not only the use of Cloud is all just good, there is also a shortage of Cloud. However, never be afraid to use what is called Cloud Computing.

What readers need to note is that there is no single safe and good system. If there is a safe and good system, there is no need for a system update and bug fixes.

***Advantages:**

1.Scalability. Compared to a few years ago, cloud-hosted databases can be scaled quickly, cheaply, and efficiently.

2.Reduced Administrative Burden.

3.Improved Security.

4.Inflexibility.

***Disadvantages:**

1.Risk of data confidentiality.

2.Depends on internet connection.

3. The level of security.

4. Vulnerable in the event of an attack.

9. **Centralized Database:**

The data is stored centrally and users from various locations can access this data. This database includes hiring processes that help users even from a remote location to access the data. For verification and validation of end-users, various types of authentication procedures are applied, and the application processes keeping a track and record of data utilization also provide registration numbers.

***Advantages:**

Data integrity is maximized and data redundancy is minimised,as the single storing place of all the data also implies that a given set of data only has one primary record.

This aids in the maintaining of data as accurate and as consistent as possible and enhances data reliability.

Generally bigger data security, as the single data storage location implies only a one possible place from which the database can be attacked and sets of data can be stolen or tampered with.

Better data preservation than other types of databases due to often-included fault-tolerant setup.

Easier for using by the end-user due to the simplicity of having a single database design.

Generally easier data portability and database administration.

***Disadvantages:**

Centralized databases are highly dependent on network connectivity. The slower the internet connection is, the longer the database access time needed will be.

Bottlenecks can occur as a result of high traffic.

Limited access by more than one person to the same set of data as there is only one copy of it and it is maintained in a single location.[8] This can lead to major decreases in the general efficiency of the system.

If there is no fault-tolerant setup and hardware failure occurs, all the data within the database will be lost.

10.**End User Database:**

The end-user is generally not worried about purchases or transactions at different levels and only understands the commodity that is a program or application.

It is, therefore, a collaborative database that is designed specifically for the end-user as do the managers at various levels. This database offers a list of all the details.

An end user database software is simply a software which helps store data created by an end user. Examples of such software could include, word processors, spreadsheet managers etc. Any database software which allows the end user to create and manage data comes under this category.

***What is end user example?**

An end user is a person that actually uses a product or service. For example, someone might buy perfume for themself, the end user.

Another person might purchase razors and blades so they can shave in the morning.

***Advantages:**

Frees IS resources for higher priority projects

May help reduce the hidden backlog

Faster design/implementation cycle

More acceptable to users

Reduces communications problems between users and IS

Encourages innovation and creative solutions

***Disadvantages:**

Duplication or effort and waste of resources

Greatly increased costs

Loss of control over data

Loss of control of quality in both programs and data

Incompatibles prevent sharing

Can be used to circumvent control processes, such as the steering committee

Generally produces narrow, inflexible systems with short lives