

Distributed System

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Distributed Database

Distributed Database :

A **distributed database** is a collection of multiple interconnected databases, which are spread physically across various locations that communicate via a computer network.

.In a distributed database, there are a number of databases that may be geographically distributed all over the world. A distributed DBMS manages the distributed database in a manner so that it appears as one single database to users.



Distributed Database

Features:

- ❑ Databases in the collection are logically interrelated with each other. Often they represent a single logical database.
- ❑ Data is physically stored across multiple sites. Data in each site can be managed by a DBMS independent of the other sites.
- ❑ The processors in the sites are connected via a network. They do not have any multiprocessor configuration.
- ❑ A distributed database is not a loosely connected file system.
- ❑ A distributed database incorporates transaction processing, but it is not synonymous with a transaction processing system.

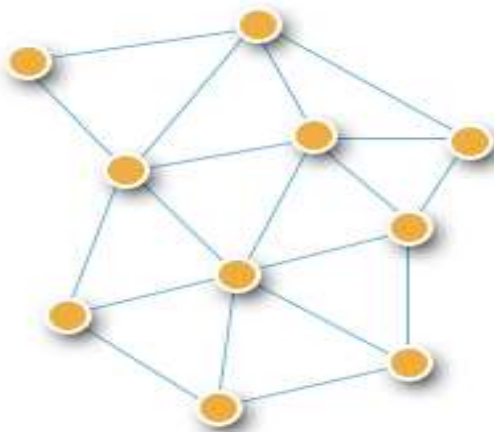


Distributed DBMS

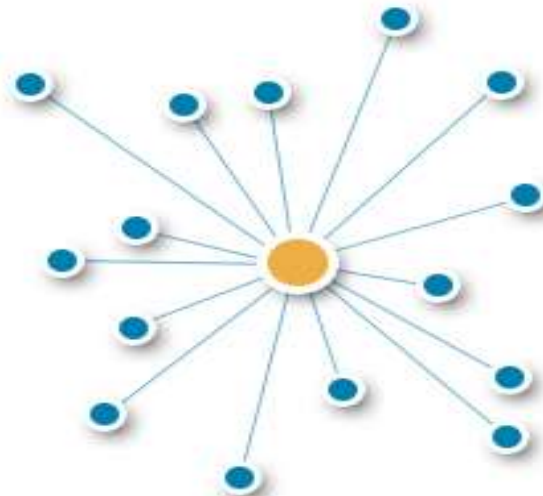
Distributed Database Management System:

A distributed database management system (DDBMS) is a centralized software system that manages a distributed database in a manner as if it were all stored in a single location.

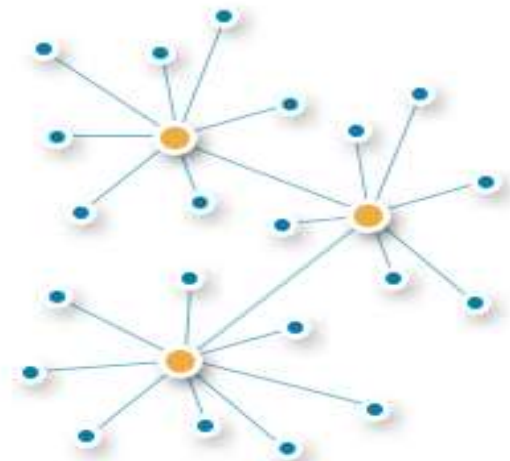
Distributed



Centralized



Decentralized



Distributed DBMS

Features:

- ❑ It is used to create, retrieve, update and delete distributed databases.
- ❑ It synchronizes the database periodically and provides access mechanisms by the virtue of which the distribution becomes transparent to the users.
- ❑ It ensures that the data modified at any site is universally updated.
- ❑ It is used in application areas where large volumes of data are processed and accessed by numerous users simultaneously.
- ❑ It is designed for heterogeneous database platforms.
- ❑ It maintains confidentiality and data integrity of the databases.



Advantages of Distributed Databases

Following are the advantages of distributed databases over centralized databases.

More Reliable – In case of database failures, the total system of centralized databases comes to a halt. However, in distributed systems, when a component fails, the functioning of the system continues may be at a reduced performance. Hence DDBMS is more reliable.

Better Response – If data is distributed in an efficient manner, then user requests can be met from local data itself, thus providing faster response. On the other hand, in centralized systems, all queries have to pass through the central computer for processing, which increases the response time.

Lower Communication Cost – In distributed database systems, if data is located locally where it is mostly used, then the communication costs for data manipulation can be minimized.



Distributed Database Design Issues

1. Distributed database design:-

There are two basic alternatives to placing data: partitioned (or non-replicated) and replicated.

2. Distributed Directory Management:-

A directory contains information (such as descriptions and locations) about data items in the database.

3. Distributed Query Processing:-

Query processing deals with designing algorithms that analyze queries and convert them into a series of data manipulation operations.



Distributed Database Design Issues

4 .Distributed Concurrency Control:-

Concurrency control involves the synchronization of accesses to the distributed data-base, such that the integrity of the database is maintained.

5. Distributed Deadlock Management:-

The competition among users for access to a set of resources (data, in this case) can result in a deadlock if the synchronization mechanism is based on locking.



Distributed Database Design Issues

6. Reliability of Distributed DBMS:-

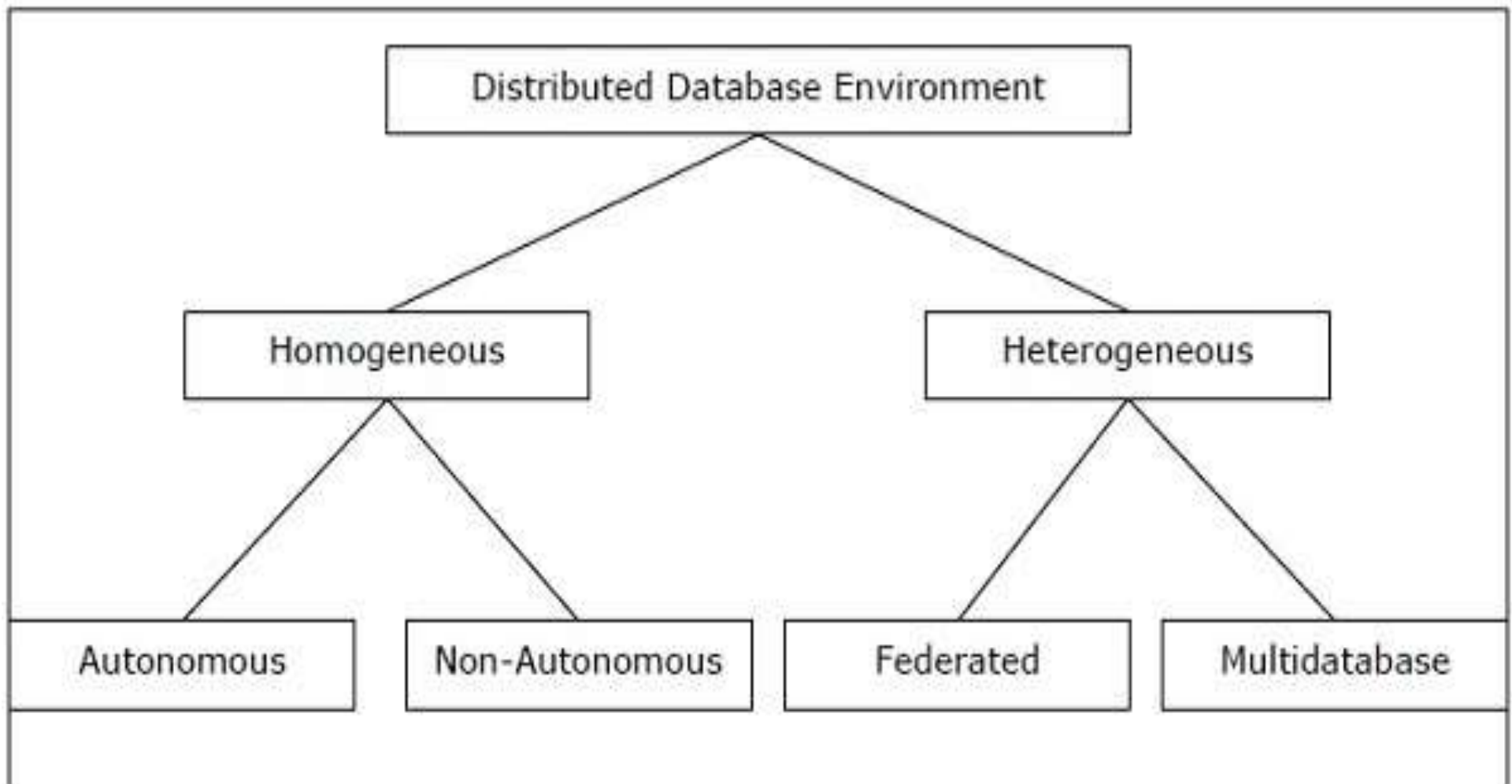
It is important that mechanisms be provided to ensure the consistency of the database as well as to detect failures and recover from them. The implication for DDBSs is that when a failure occurs and various sites become inaccessible, the databases at the operational sites remain consistent and up to date.

7 . Replication:-

If the distributed database is (partially or fully) replicated, it is necessary to implement protocols that ensure the consistency of the replicas , i.e., copies of the same data item have the same value.



Types of Distributed Databases



Types of Distributed Databases

Homogeneous Distributed Databases:

In a homogeneous distributed database, all the sites use identical DBMS and operating systems.

Its properties are :

- The sites use very similar software.
- The sites use identical DBMS or DBMS from the same vendor.
- Each site is aware of all other sites and cooperates with other sites to process user requests.
- The database is accessed through a single interface as if it is a single database.



Types of Distributed Databases

Types of Homogeneous Distributed Database

There are two types of homogeneous distributed database:

Autonomous:

Each database is independent that functions on its own. They are integrated by a controlling application and use message passing to share data updates.

Non-Autonomous:

Data is distributed across the homogeneous nodes and a central or master DBMS co-ordinates data updates across the sites.



Types of Distributed Databases

Heterogeneous Distributed Databases:

In a heterogeneous distributed database, different sites have different operating systems, DBMS products and data models.

Its properties are:

- Different sites use dissimilar schemas and software.
- The system may be composed of a variety of DBMSs like relational, network, hierarchical or object oriented.
- Query processing is complex due to dissimilar schemas.
- Transaction processing is complex due to dissimilar software.
- A site may not be aware of other sites and so there is limited co-operation in processing user requests.



Types of Distributed Databases

Types of Heterogeneous Distributed Databases:

There are two types of heterogeneous distributed database:

Federated:

The heterogeneous database systems are independent in nature and integrated together so that they function as a single database system.

Un-Federated:

The database systems employ a central coordinating module through which the databases are accessed.



THANK YOU

ANY QUERY???

