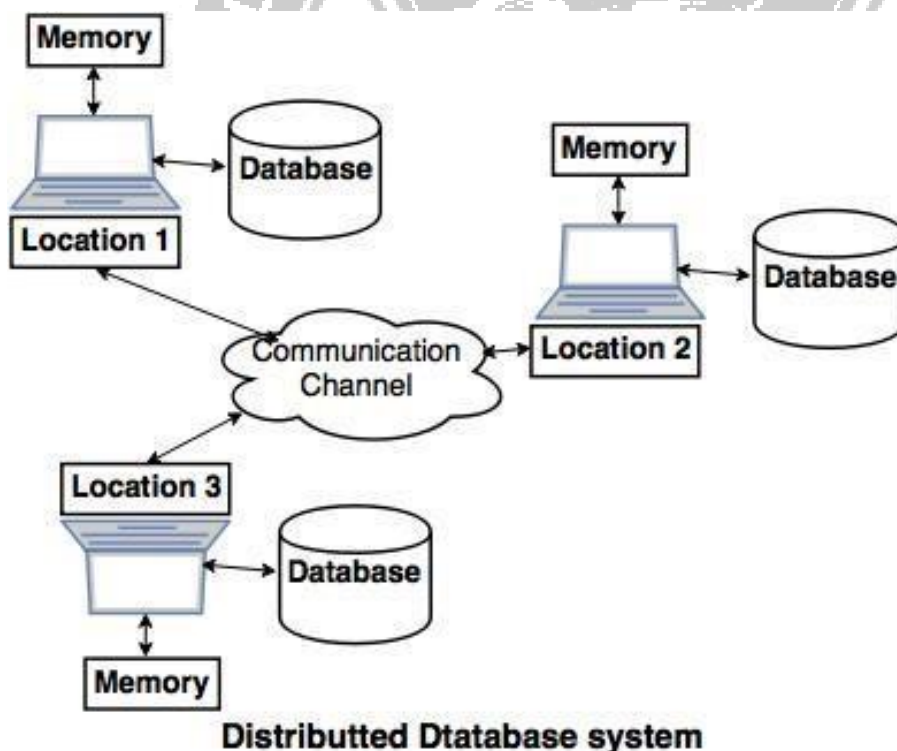


1. DISTRIBUTED DATABASES

A distributed database is a database in which not all storage devices are attached to a common processor. It may be stored in multiple computers, located in the same physical location; or may be dispersed over a network of interconnected computers.

- Distributed database is a system in which storage devices are not connected to a common processing unit.
- Database is controlled by Distributed Database Management System and data may be stored at the same location or spread over the interconnected network. It is a loosely coupled system.
- Shared nothing architecture is used in distributed databases.



Distributed Database System

Communication channel is used to communicate with the different locations and every system has its own memory and database.

Reliability: In distributed database system, if one system fails down or stops working for some time another system can complete the task.

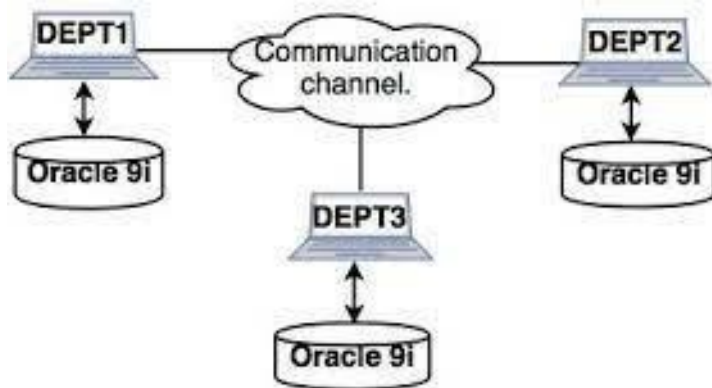
Availability: In distributed database system reliability can be achieved even if sever fails down. Another system is available to serve the client request. **Performance:** Performance can be achieved by distributing database over different locations. So the databases are available to every location which is easy to maintain.

(i) Homogeneous distributed databases system:

Homogeneous distributed database system is a network of two or more databases (With same type of DBMS software) which can be stored on one or more machines.

So, in this system data can be accessed and modified simultaneously on several databases in the network. Homogeneous distributed system are easy to handle.

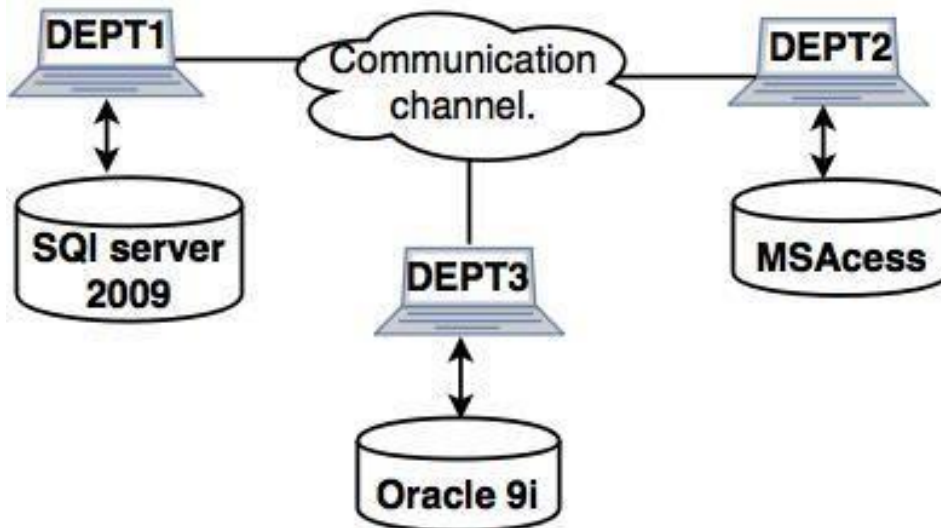
Example: Consider that we have three departments using Oracle-9i for DBMS. If some changes are made in one department then, it would update the other department also.



Homogeneous distributed system

(ii) Heterogeneous distributed database system.

- Heterogeneous distributed database system is a network of two or more databases with different types of DBMS software, which can be stored on one or more machines.
- In this system data can be accessible to several databases in the network with the help of generic connectivity (ODBC and JDBC).
- Example: In the following diagram, different DBMS software are accessible to each other using ODBC and JDBC.



Heterogeneous distributed system

1.

1.1 DISTRIBUTED DBMS ARCHITECTURES

DDBMS architectures are generally developed depending on three parameters – **Distribution** – It states the physical distribution of data across the different sites. **Autonomy** – It indicates the distribution of control of the database system and the degree to which each constituent DBMS can operate independently. **Heterogeneity** – It refers to the uniformity or dissimilarity of the data models, system components and databases.

Architectural Models

Some of the common architectural models are –

- Client - Server Architecture for DDBMS
- Peer - to - Peer Architecture for DDBMS
- Multi - DBMS Architecture

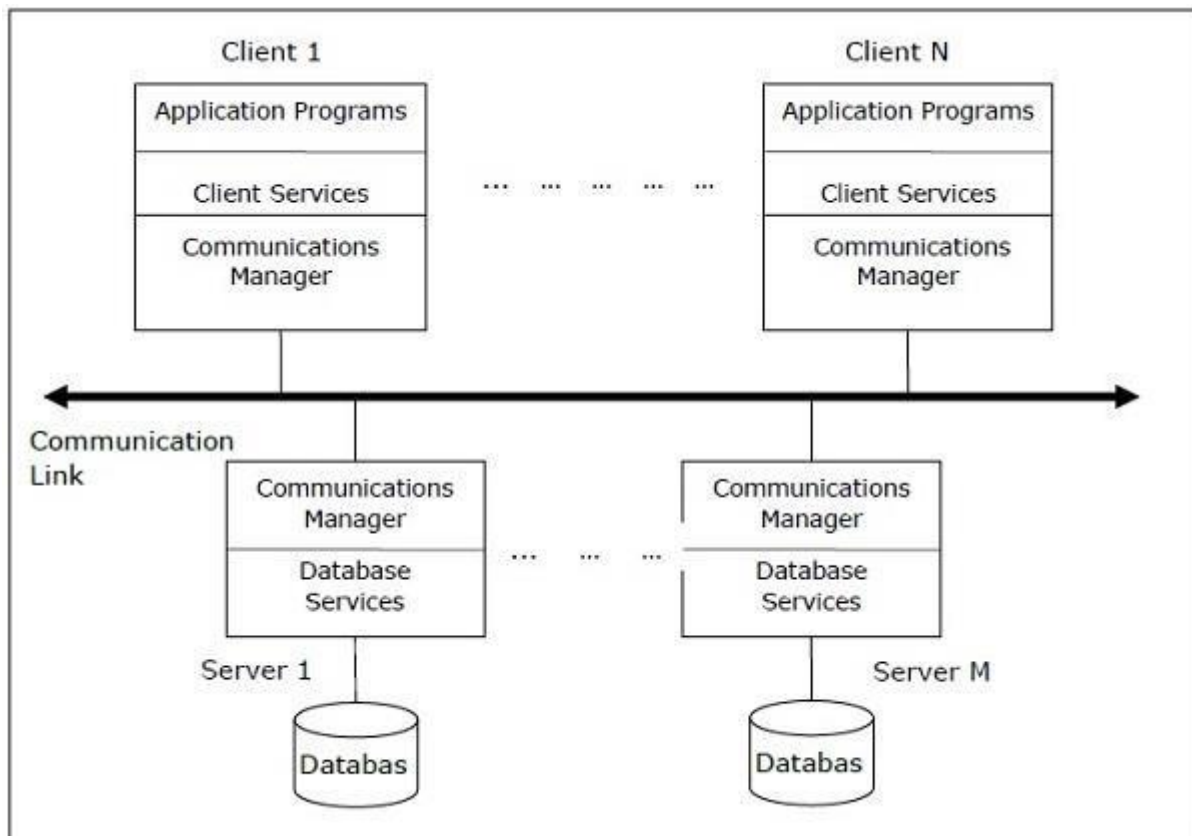
1. Client - Server Architecture for DDBMS

This is a two-level architecture where the functionality is divided into servers and clients. The server functions primarily encompass data management, query processing, optimization and transaction management.

Client functions include mainly user interface. However, they have some functions like consistency checking and transaction management.

The two different client - server architecture are

- Single Server Multiple Client
- Multiple Server Multiple Client (shown in the following diagram)



2. Peer- to-Peer Architecture for DDBMS

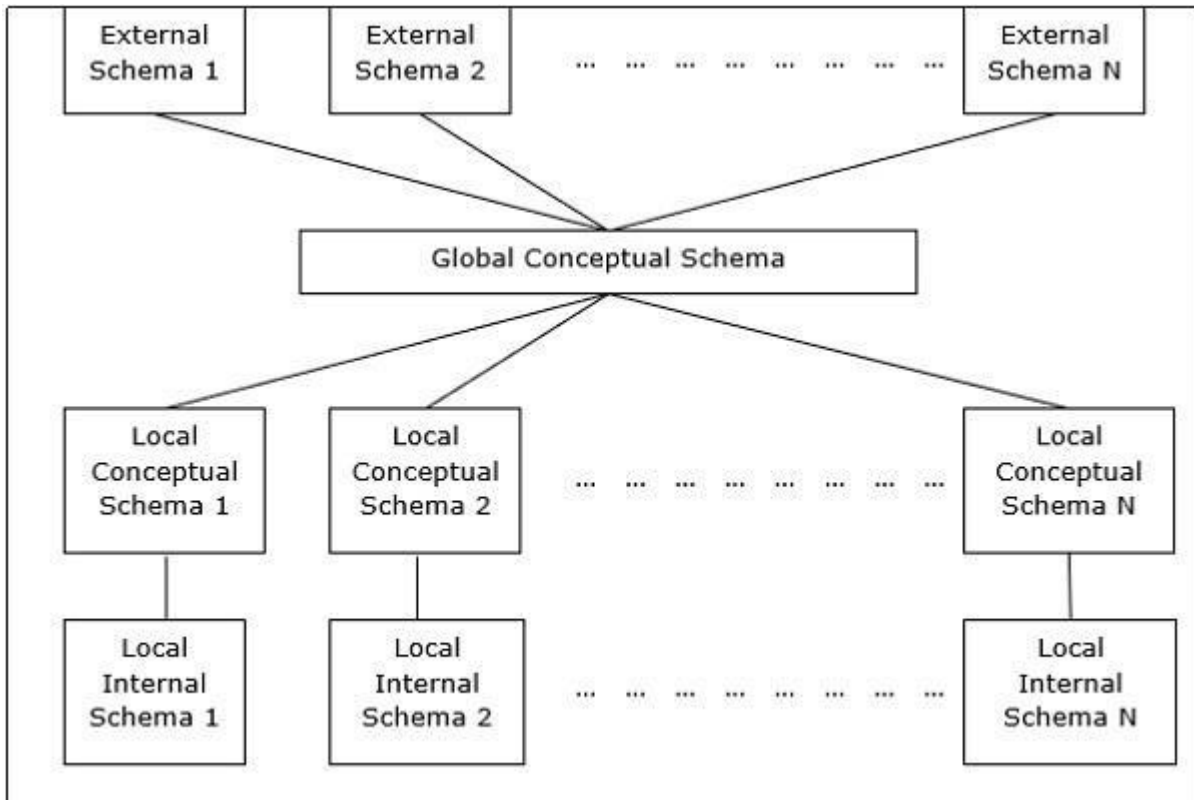
In these systems, each peer acts both as a client and a server for imparting database services. The peers share their resource with other peers and co-ordinate their activities. This architecture generally has four levels of schemas

Global Conceptual Schema– Depicts the global logical view of data.

Local Conceptual Schema – Depicts logical data organization at each site.

Local Internal Schema – Depicts physical data organization at each site.

External Schema – Depicts user view of data.



3. Multi - DBMS Architectures

This is an integrated database system formed by a collection of two or more autonomous database systems. Multi-DBMS can be expressed through six levels of schemas

Multi-database View Level – Depicts multiple user views comprising of subsets of the integrated distributed database.

Multi-database Conceptual Level – Depicts integrated multi-database that comprises of global logical multidatabase structure definitions.

Multi-database Internal Level – Depicts the data distribution across different sites and multi-database to local data mapping.

Local database View Level – Depicts public view of local data.

Local database Conceptual Level – Depicts local data organization at each site. **Local database**

Internal Level – Depicts physical data organization at each site. There are two design alternatives for multi-DBMS –

- Model with multi-database conceptual level.
- Model without multi-database conceptual level.