Distributed Database System

A distributed database is basically a database that is not limited to one system, it is spread over different sites, i.e, on multiple computers or over a network of computers.

A distributed database system is located on various sites that don't share physical components.

This may be required when a particular database needs to be accessed by various users globally.

It needs to be managed such that for the users it looks like one single database.

Types:

❖Homogeneous Database

❖Heterogeneous Database

➢Homogeneous Database

In a homogeneous database, all different sites store database identically.

The operating system, database management system, and the data structures used – all are the same at all sites.

Hence, they're easy to manage.

➤ Heterogeneous Database:

In a heterogeneous distributed database, different sites can use different schema and software that can lead to problems in query processing and transactions.

Also, a particular site might be completely unaware of the other sites. Different computers may use a different operating system, different database application.

They may even use different data models for the database. Hence, translations are required for different sites to communicate.

Importance of Distributed Database Systems

[Scalability]:

❖Distributed database systems provide the ability to scale horizontally by adding more nodes or servers to the system.

❖This allows organizations to handle increasing volumes of data and transaction loads without compromising performance.

❖Scalability is crucial for applications that experience rapid growth or fluctuating demands.
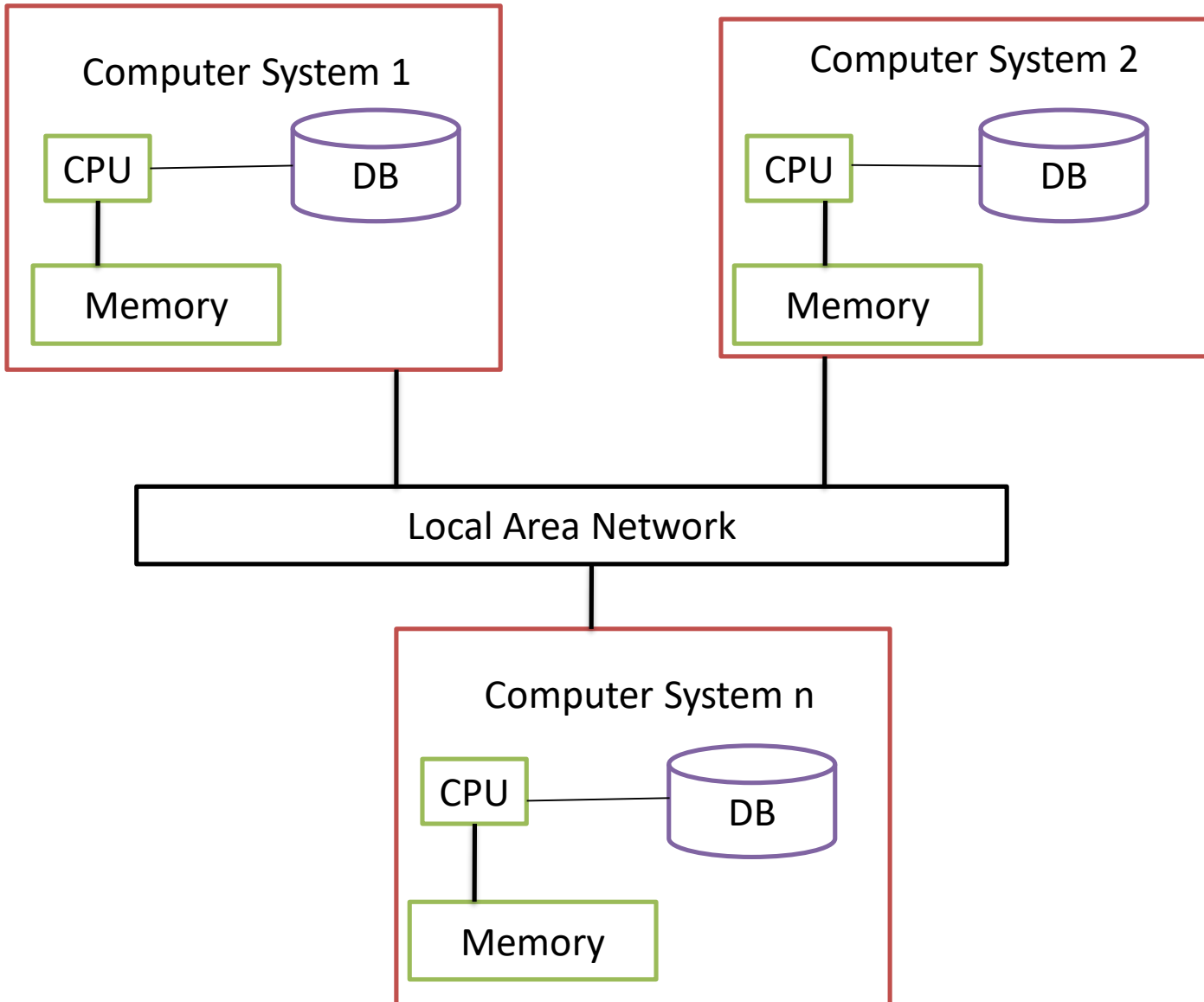
High Availability:

❖By distributing data across multiple nodes and locations, distributed databases enhance availability.

❖Even if one node or data center experiences a failure or outage, the rest of the system can continue to operate, ensuring that applications remain accessible and responsive.

❖This is critical for mission-critical applications and services that require uninterrupted operation.

Fault Tolerance:

❖Distributed databases employ redundancy and replication techniques to ensure fault tolerance.

❖Data is replicated across multiple nodes, so if one node fails, there are backups available on other nodes.

❖This redundancy minimizes the risk of data loss and downtime, thereby enhancing system reliability.

Structure of Distributed Database

No Database Sharing Architecture

Network Architecture with a Centralized Database

DB1

DB2

Central Site

Site Hyderabad

Site Warangal

Communication
Network

Site Karimnagar

Site Adilabad