VIRTUALIZATION AND CLOUD COMPUTING

CSE 423 LECTURE -2

PEER TO PEER (P2P)

There is no central control in a distributed system behind peer to peer. The fundamental idea is that at a certain time each node can be a client or a server. If something is asked from the node, it could be referred to as a client and if something arrives from a node it could be referred to as a server. Usually every node is called a peer

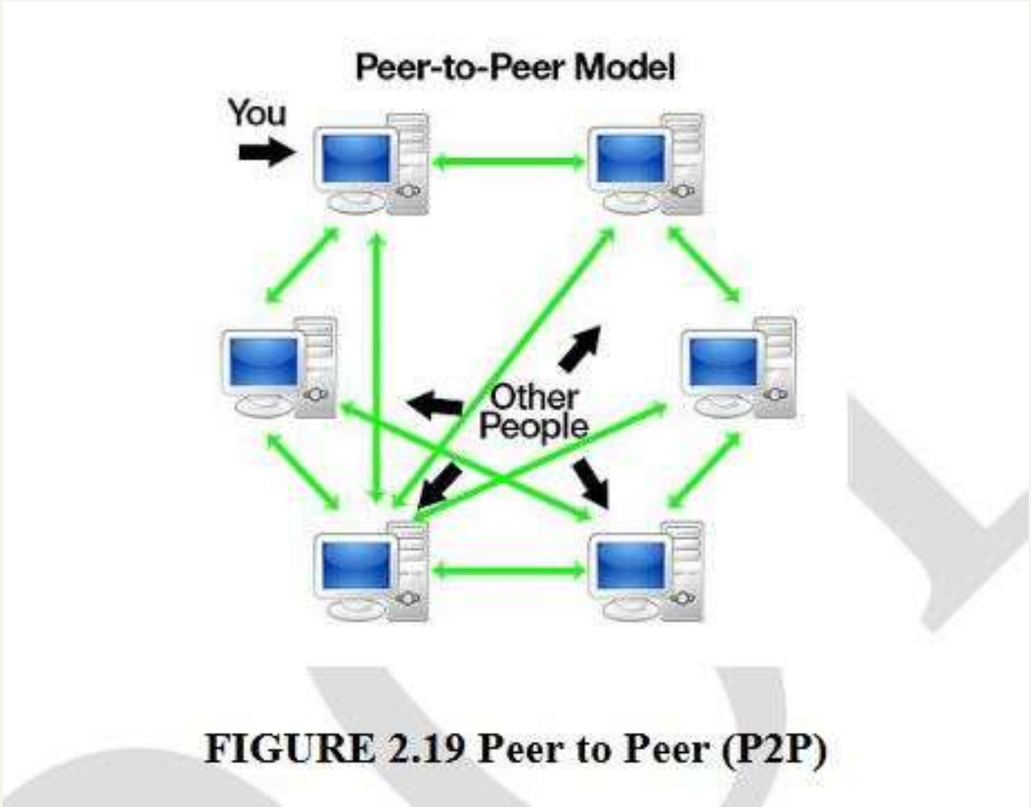


FIGURE 2.19 Peer to Peer (P2P)

A Comparison between Client Server and Peer to Peer Architectures

BASIS FOR COMAPARISON	CLIENT-SERVER	PEER-TO-PEER
Basic	There is a specific server and specific clients connected to the server	Clients and server are not distinguished; each node act as client and server.
Service	The client request for service and server respond with the service.	Each node can request for services and can also provide the services.
Focus	Sharing the information.	Connectivity.
Data	The data is stored in a centralized server.	Each peer has its own data.
Server	When several clients request for the services simultaneously, a server can get bottlenecked.	As the services are provided by several servers distributed in the peer-to-peer system, a server in not bottlenecked.
Expense	The client-server are expensive to implement.	Peer-to-peer are less expensive to implement.

UTILITY COMPUTING

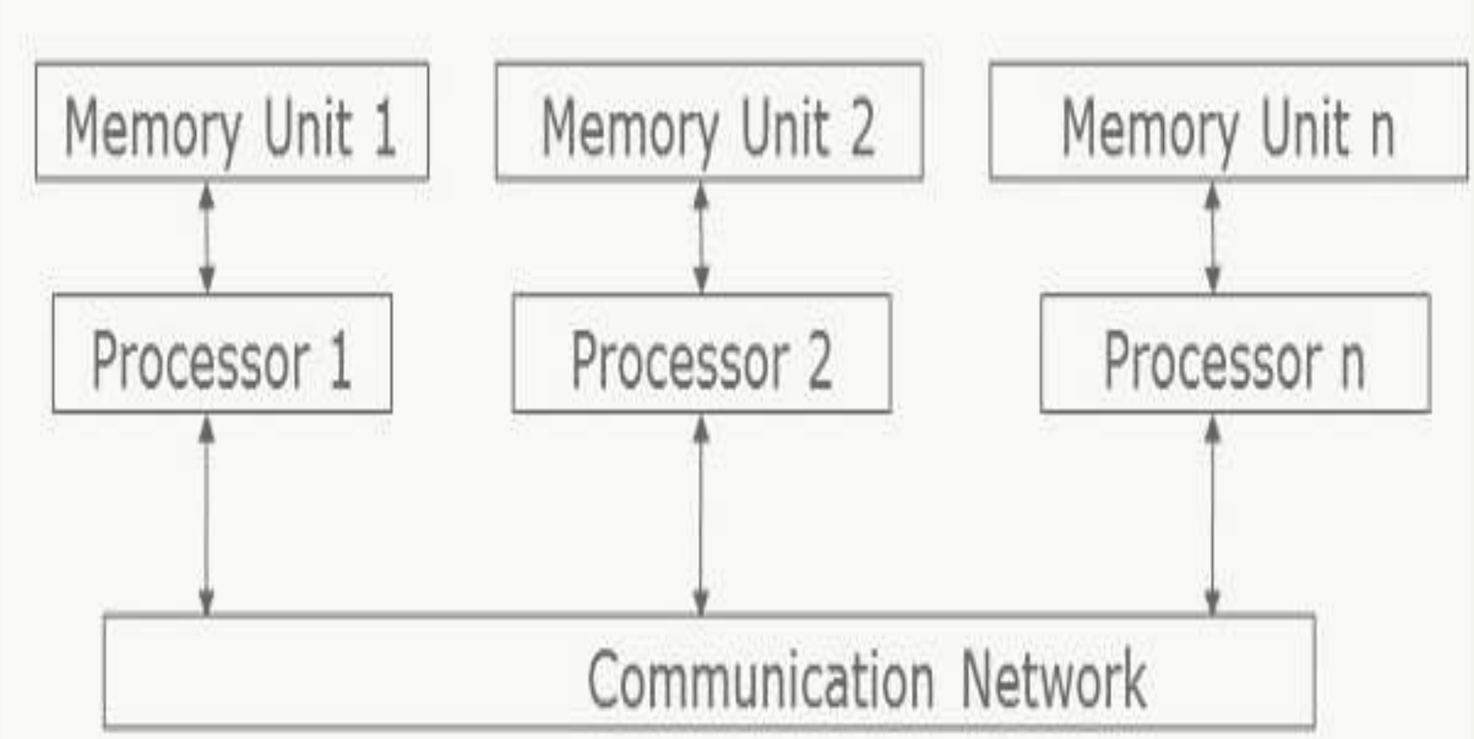
- Utility computing is a model in which computing resources are provided to the customer based on specific demand.
- The service provider charges exactly for the services provided, instead of a flat rate.
- The foundational concept is that users or businesses pay the providers of utility computing for the amenities used – such as computing capabilities, storage space, and applications services. The customer is thus, absolved from the responsibility of maintenance and management of the hardware. Consequently, the financial layout is minimal for the organization.

- Utility computing helps eliminate data redundancy, as huge volumes of data are distributed across multiple servers or backend systems. The client, however, can access the data anytime and from anywhere.

PARALLEL SYSTEMS

- The concepts introduced in this section are very important in practice. Communication protocols support coordination of distributed processes and transport information through communication channels
- Parallel computing allows us to solve large problems by splitting them into smaller ones and solving them concuParallel hardware and software systems allow us to solve problems demanding more resources than those provided by a single system and, at the same time, to reduce the time required to obtain a solution.
- The speed-up measures the effectiveness of parallelization; in the general case, the speed-up of the parallel computation is defined by Amdahl's Law
- Coordination of concurrent computations could be quite challenging and involves overhead, which ultimately reduces the speed-up of parallel computations. Often the parallel computation involves multiple stages, and all concurrent activities must finish one stage before starting the execution of the next one

Elements in Parallel Computing Model



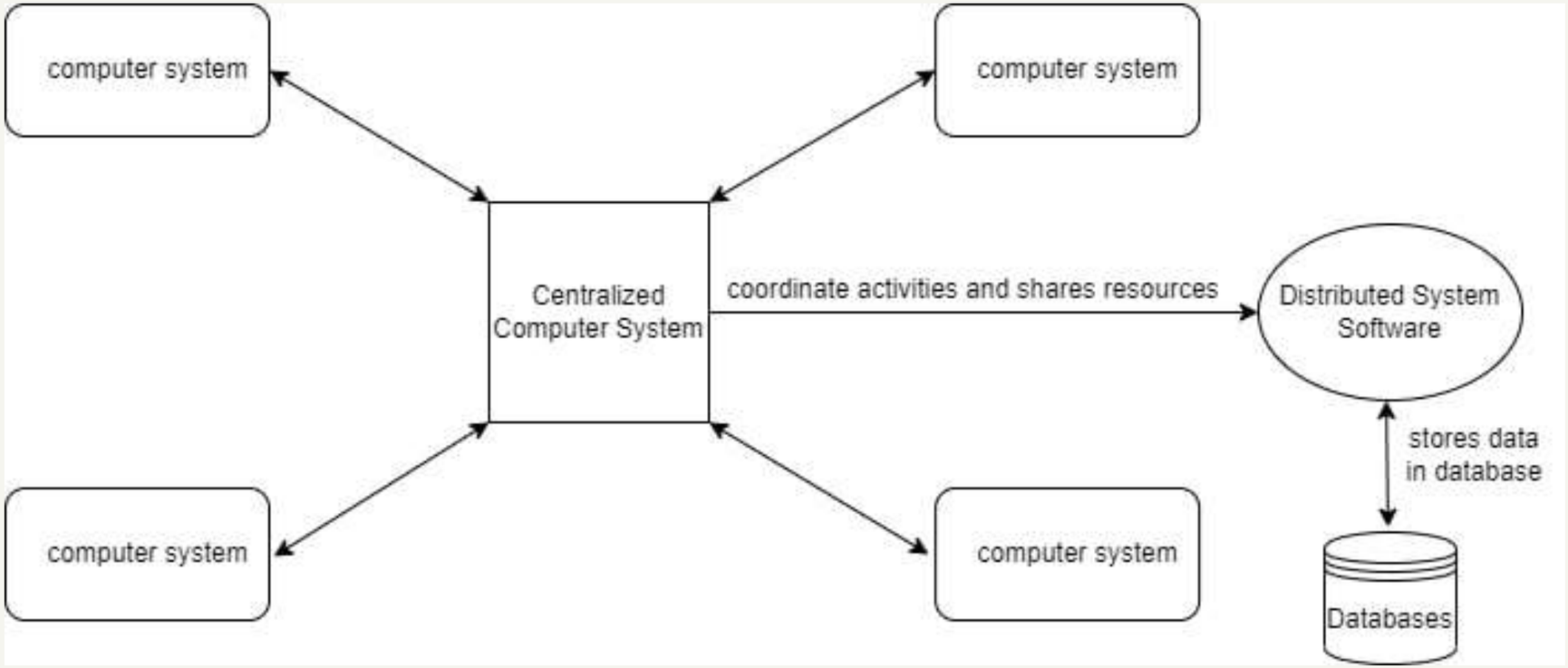
DISTRIBUTED SYSTEMS

- A distributed system is a collection of autonomous computers that are connected through a network and distribution software called middleware, which enables computers to coordinate their activities and to share the resources of the system. A distributed system's users perceive the system as a single integrated computing facility.
- Distributed System is a collection of autonomous computer systems that are physically separated but are connected by a centralized computer network that is equipped with distributed system software. The autonomous computers will communicate among each system by sharing resources and files and performing the tasks assigned to them.
- Distributed systems can be scaled by adding additional resources and can be designed to maintain availability even at low levels of hardware/software/network reliability.
- Distributed systems have been around for several decades. For example, distributed file systems and network file systems have been used for user convenience and to improve reliability and functionality of file systems for many years.

DISTRIBUTED SYSTEMS

Distributed System Software: This Software enables computers to coordinate their activities and to share the resources such as Hardware, Software, Data, etc.

Database: It is used to store the processed data that are processed by each Node/System of the Distributed systems that are connected to the Centralized network.



DISTRIBUTED ADVANTAGES

- **Scalability.** Distributed computing clusters are easy to scale through a "scale-out architecture" in which higher loads can be handled by simply adding new hardware (versus replacing existing hardware).
- **Performance.** Through parallelism in which each computer in the cluster simultaneously handles a subset of an overall task, the cluster can achieve high levels of performance through a divide-and-conquer approach.
- **Resilience.** Distributed computing clusters typically copy or "replicate" data across all computer servers to ensure there is no single point of failure. Should a computer fail, copies of the data on that computer are stored elsewhere so that no data is lost.
- **Cost-effectiveness.** Distributed computing typically leverages low-cost, commodity hardware, making initial deployments as well as cluster expansions very economical.

DIFFERENCE BETWEEN

PArallel Computing

- Multiple processors perform multiple tasks assigned to them simultaneously.
- These tasks are broken down from a single main problem.
- Done using a single computer Memory in parallel systems is either shared or distributed between processors.
- Multiple processors perform processing Parallel computing helps to significantly increase the performance of the system, provides concurrency, and saves time

Distributed Computing

- Multiple computers perform tasks at the same time to achieve a single decided goal through networked computers.
- Requires multiple computers Each computer has its own memory.
- Multiple computers perform multiple operations
- Allows scalability, to share resources and helps to perform computation tasks efficiently

DIFFERENCE BETWEEN

PArallel Computing

- To provide synchronization all processors share a single master clock
- Environments are tightly coupled
- Used in places requiring excessively higher and faster processing power

Example:Supercomputers

Distributed Computing

- There is no global clock, uses synchronization algorithms
- Environments might be loosely coupled or tightly coupled
- Used when computers are located at different geographical locations and speed doesn’t matter
- Example:Facebook

THANK YOU