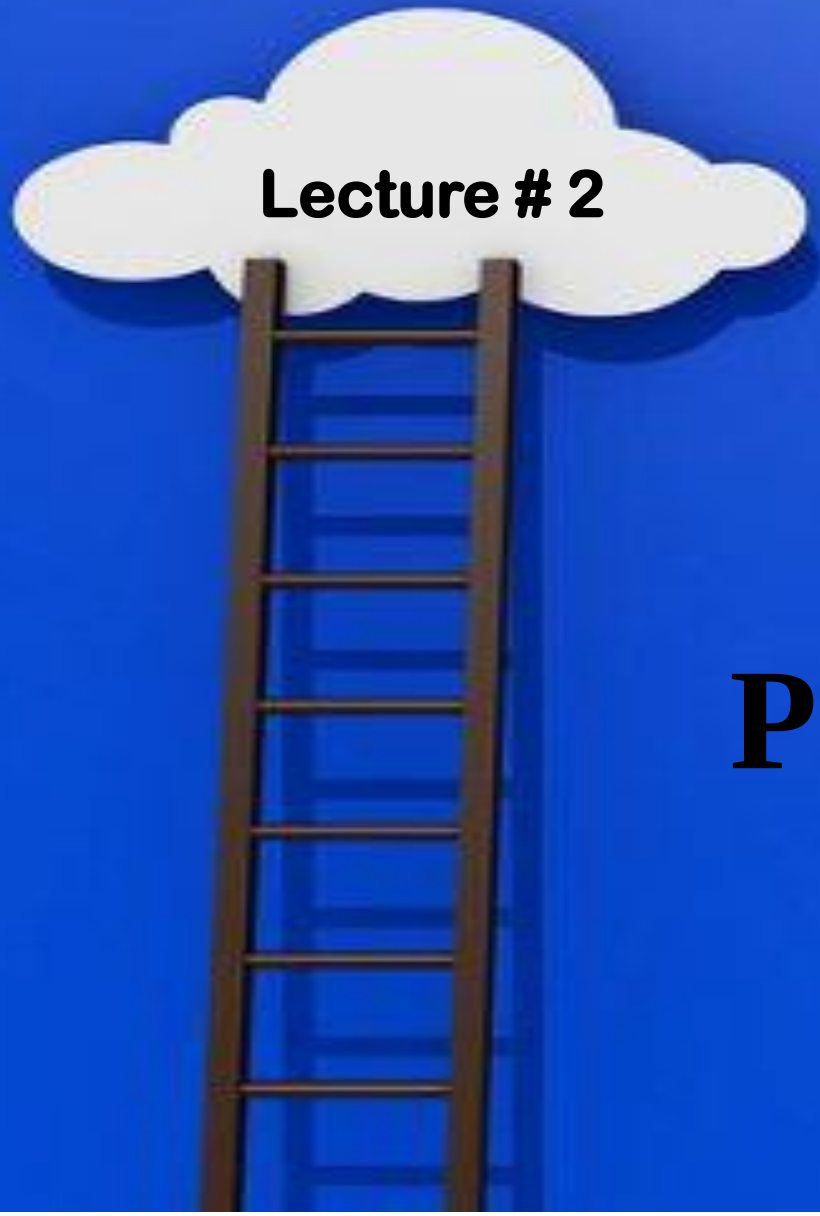


Lecture # 2

CSE 423

Parallel And Distributed Systems

Distributed Systems

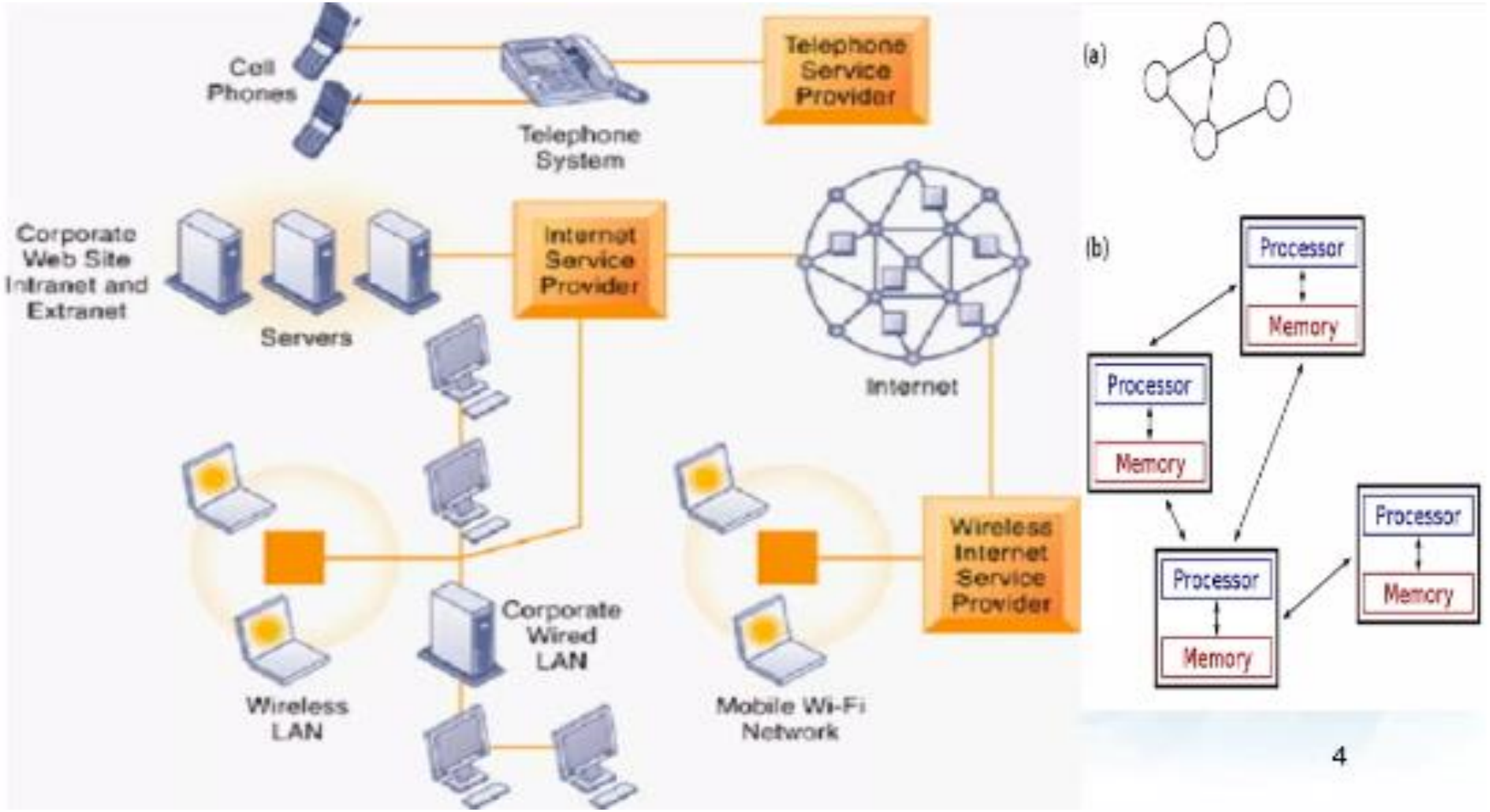
- **DEFINATION:** A distributed system is a collection of independent computers, interconnected via a network, capable of collaborating a task.

- A distributed system can be characterized as collection of multiple autonomous computers that communicate over a communication network and having following features:

Distributed Systems cont..

- Enhanced reliability
- Increased performance
- Access to geographically remote data and resources
- Scalability

A Distributed System

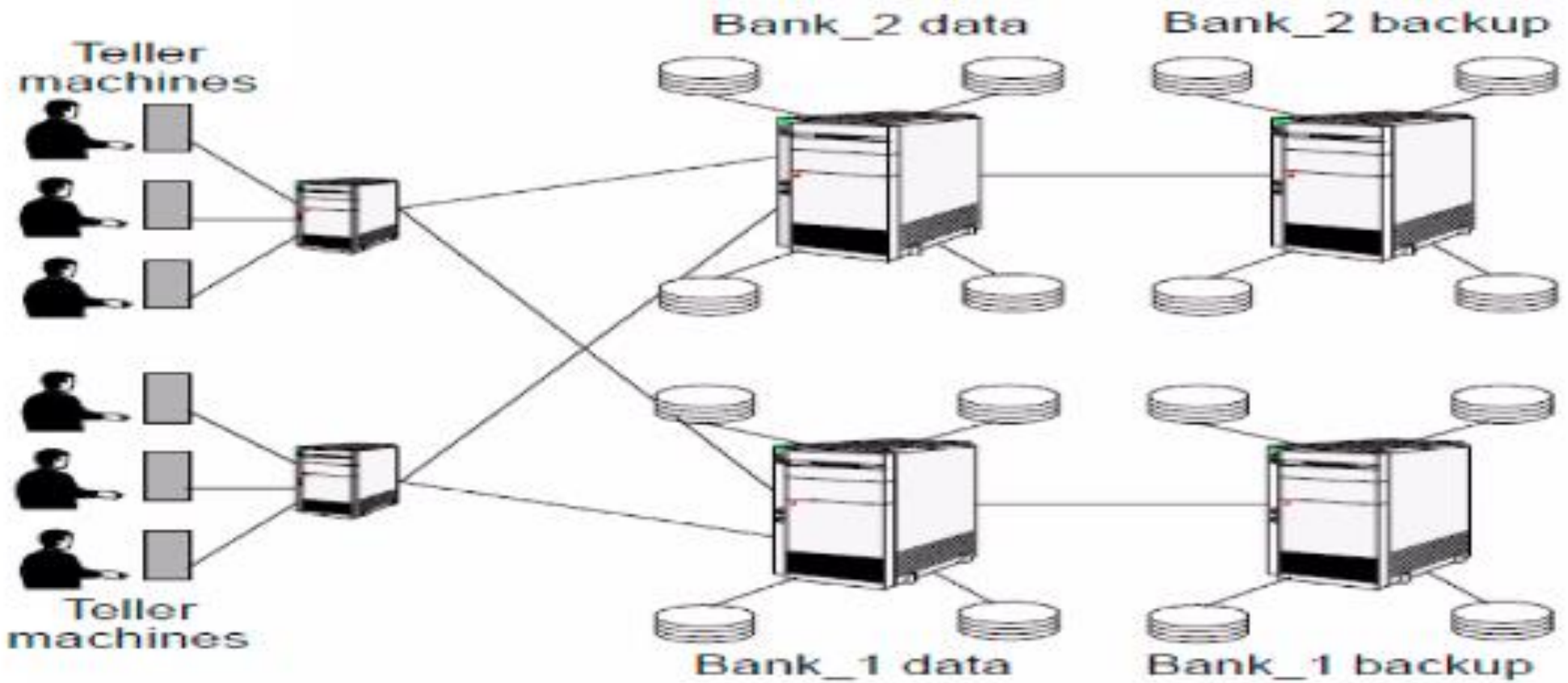


Examples of Distributed System

- Telephone Networks and Cellular Networks
- Computer Networks such as internet or intranet
- ATM Machines
- Distributed database and database management system
- Network of workstations
- Mobile computing etc.

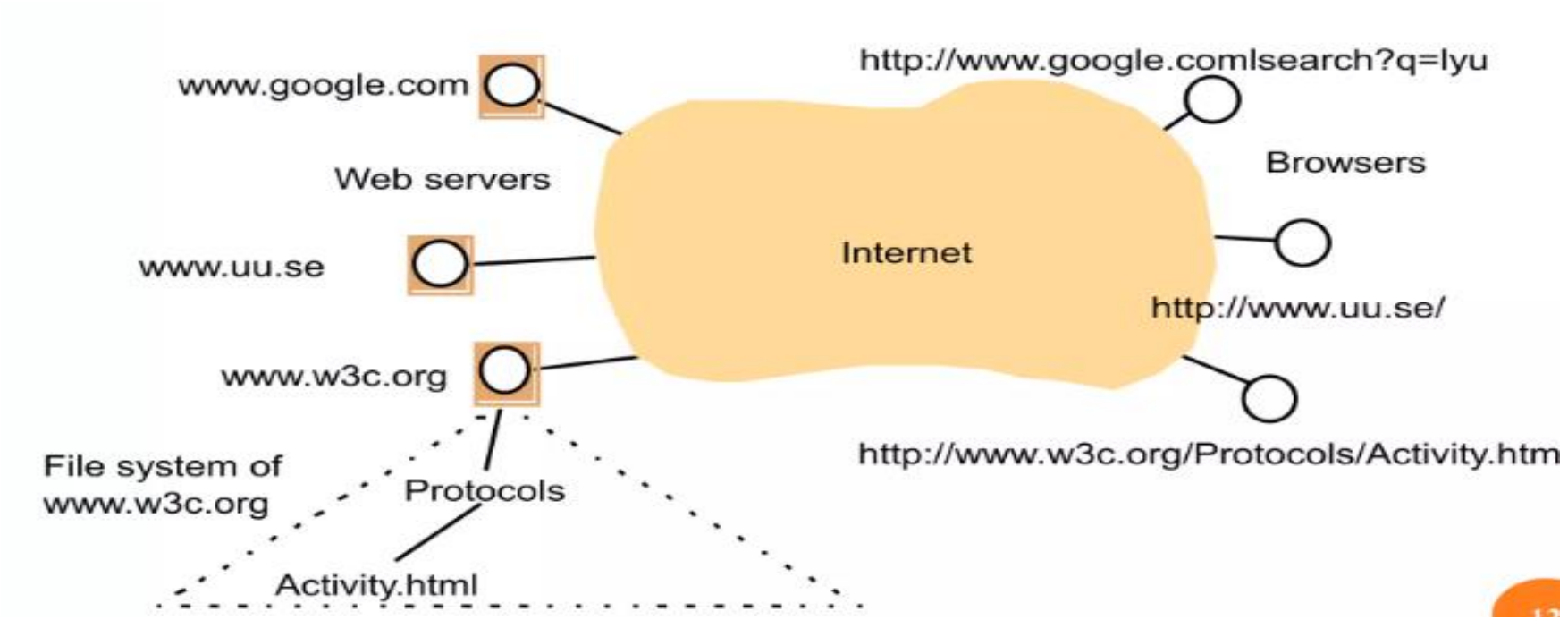
Example of Distributed System cont..

Automated Banking (Teller Machine) System



Example of Distributed System cont..

WEB SERVERS AND WEB BROWSERS



Primary requirements for distributed systems:

- ✓ Security and Reliability
- ✓ Consistency of replicated data
- ✓ Concurrent transactions
- ✓ Fault tolerance

Advantages of Distributed System

- All the nodes in the distributed system are connected to each other. So nodes can easily share data with other nodes.
- More nodes can easily be added to the distributed system i.e. it can be scaled as required.
- Failure of one node does not lead to the failure of the entire distributed system. Other nodes can still communicate with each other.
- Resources like printers can be shared with multiple nodes rather than being restricted to just one.

Advantages of Distributed System Cont..

- High reliability
- Better flexibility's in meeting user's needs
- Better price/performance ratio
- Scalability
- Transparency

Disadvantages of Distributed System

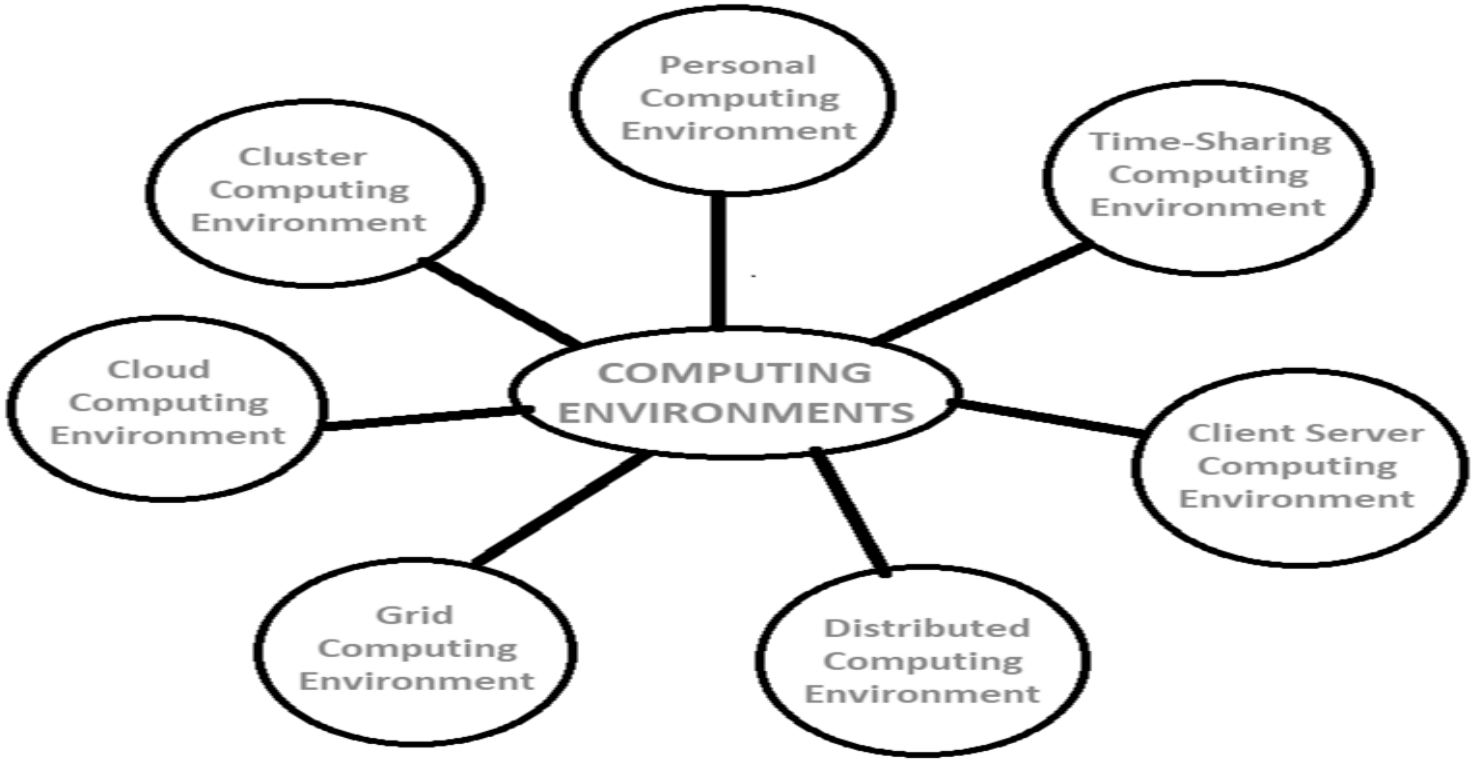
- Difficulties of developing distributed software
- Networking problem
- Security problems
- Performance
- Reliability and fault tolerance

Parallel Vs. Distributed System

	Parallel Systems	Distributed Systems
Memory	Tightly coupled system shared memory	Weakly coupled system Distributed memory
Control	Global clock control	No global clock control
Processor interconnection	Order of Tbps	Order of Gbps
Main focus	Performance Scientific computing	Performance(cost and scalability) Reliability/availability Information/resource sharing

Differences and Similarities among different types of computing

The different types of Computing Environments are:



Personal Computing Environment

- In personal computing environment there is a stand-alone machine.
- Complete program resides on computer and executed there.
- **Example:** Personal computing environment are laptops, mobiles, printers, computer systems, scanners etc. That we use at our homes and offices.

Time-Sharing Computing Environment

- In this environment multiple users share system simultaneously.
- Different users (different processes) are allotted different time slice and processor switches rapidly among users according to it.
- For example: student listening to music while coding something in an IDE. Windows 95 and later versions, Unix, IOS, Linux operating systems are the examples of this environment.

Client Server Computing Environment

- In client server computing environment two machines are involved i.e., client machine and server machine, sometime same machine also serve as client and server.
- In this computing environment client requests resource/service and server provides that respective resource/service.
- A server can provide service to multiple clients at a time and here mainly communication happens through computer network.

Distributed Computing Environment

- In a distributed computing environment multiple nodes are connected together using network but physically they are separated.
- A single task is performed by different functional units of different nodes of distributed unit.
- Here different programs of an application run simultaneously on different nodes, and communication happens in between different nodes of this system over network to solve task.

Grid Computing Environment

- In grid computing environment, multiple computers from different locations works on single problem.
- In this system set of computer nodes running in cluster jointly perform a given task by applying resources of multiple computers/nodes.
- It is network of computing environment where several scattered resources provide running environment for single task.

Cloud Computing Environment

- In cloud computing environment on demand availability of computer system resources like processing and storage are availed.
- Here computing is not done in individual technology or computer rather it is computed in cloud of computers where all required resources are provided by cloud vendor.
- This environment primarily comprised of three services i.e Software-as-a-service (SaaS), Infrastructure- as-a-service(IaaS) and platform-as-a-service (PaaS).

Cluster Computing Environment

- In cluster computing environment cluster performs task where cluster is a set of loosely or tightly connected computers that work together.
- It is viewed as single system and performs task parallelly that's why also it is similar to parallel computing environment.
- Cluster aware applications are especially used in cluster computing environment.

THANK YOU

&

ANY QUERIES?