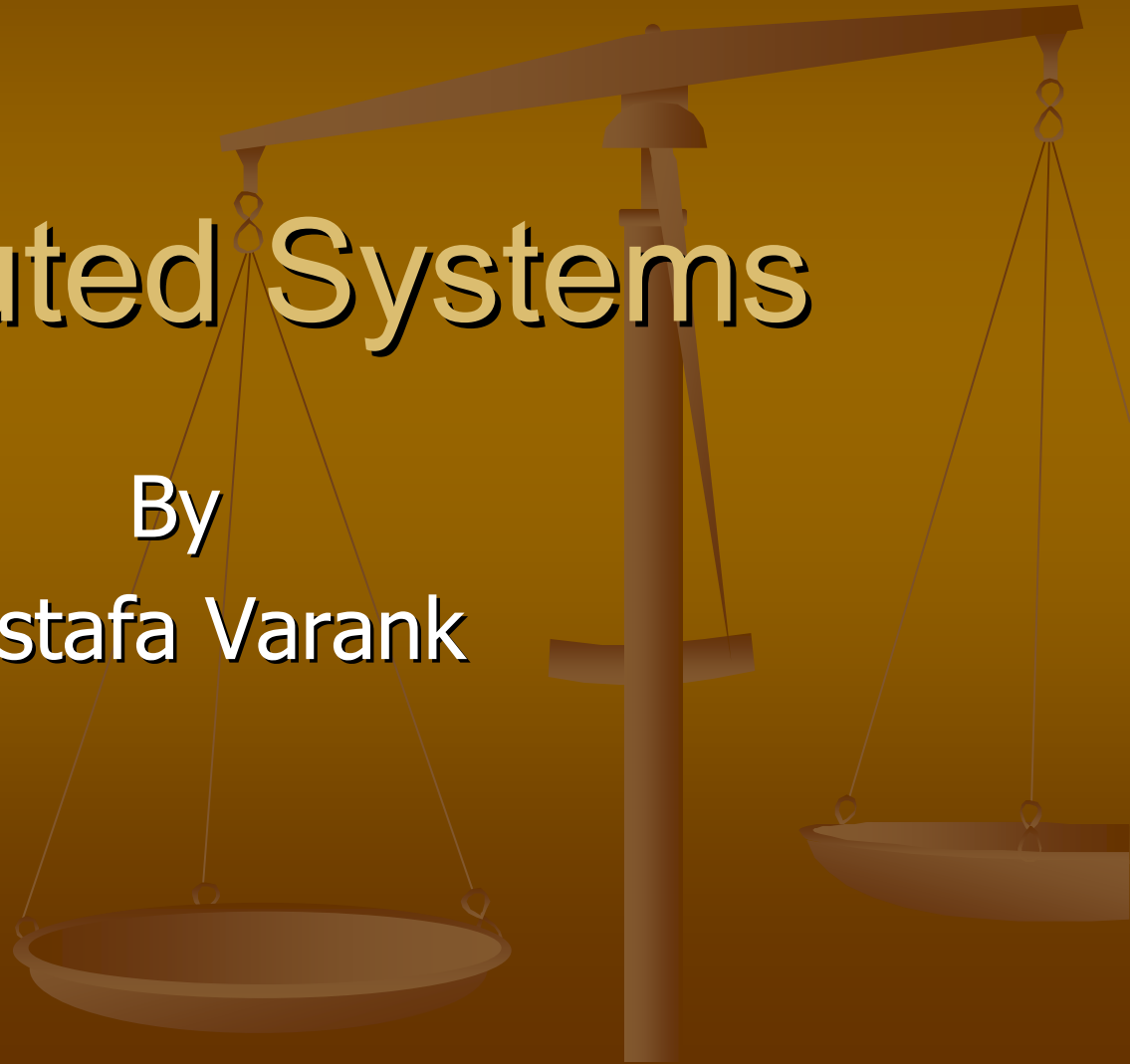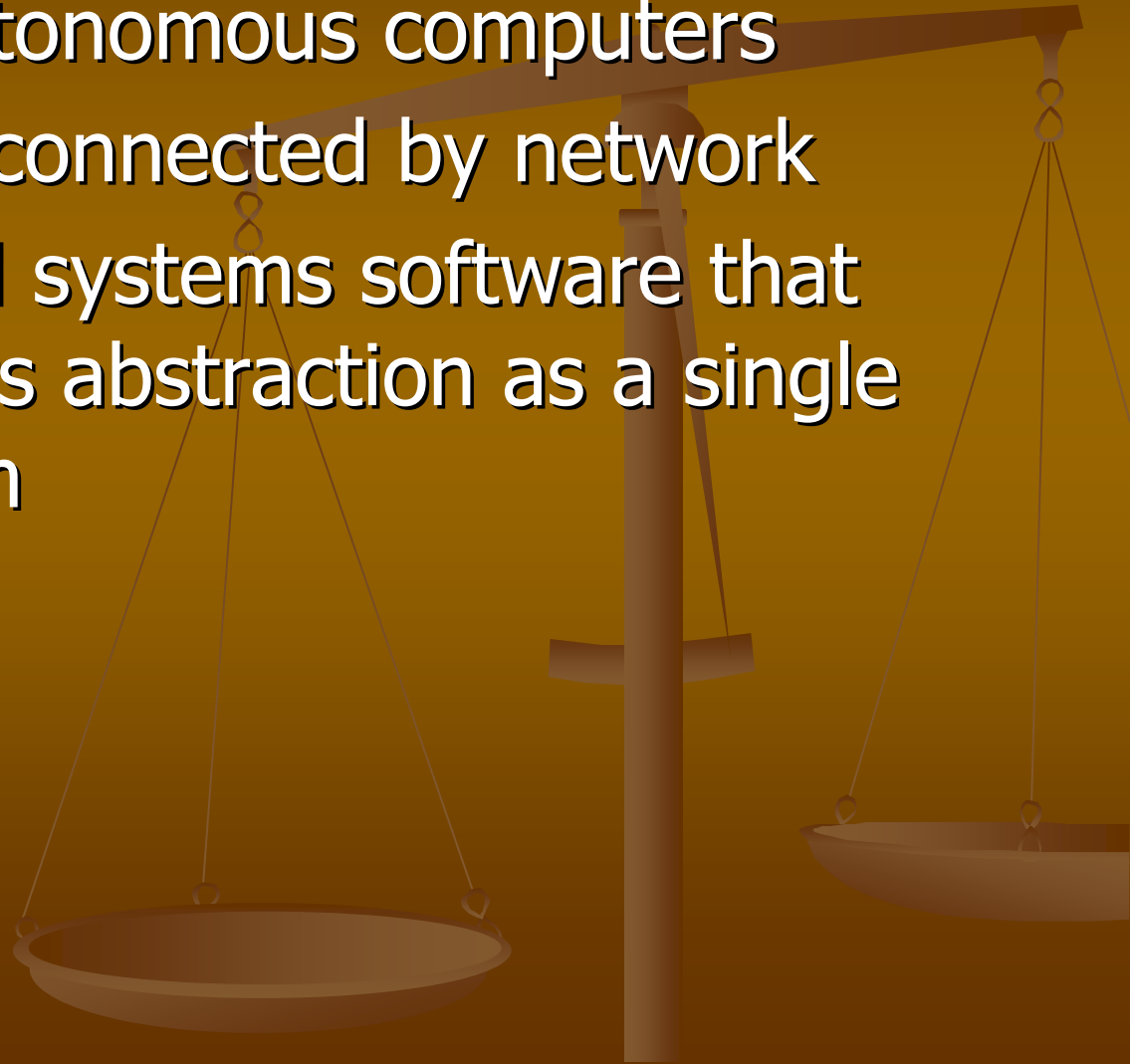# Distributed Systems

By

Mustafa Varank

What is distributed systems?

- Collection of autonomous computers
- Those systems connected by network
- Uses distributed systems software that gives to its users abstraction as a single coherent system

Example

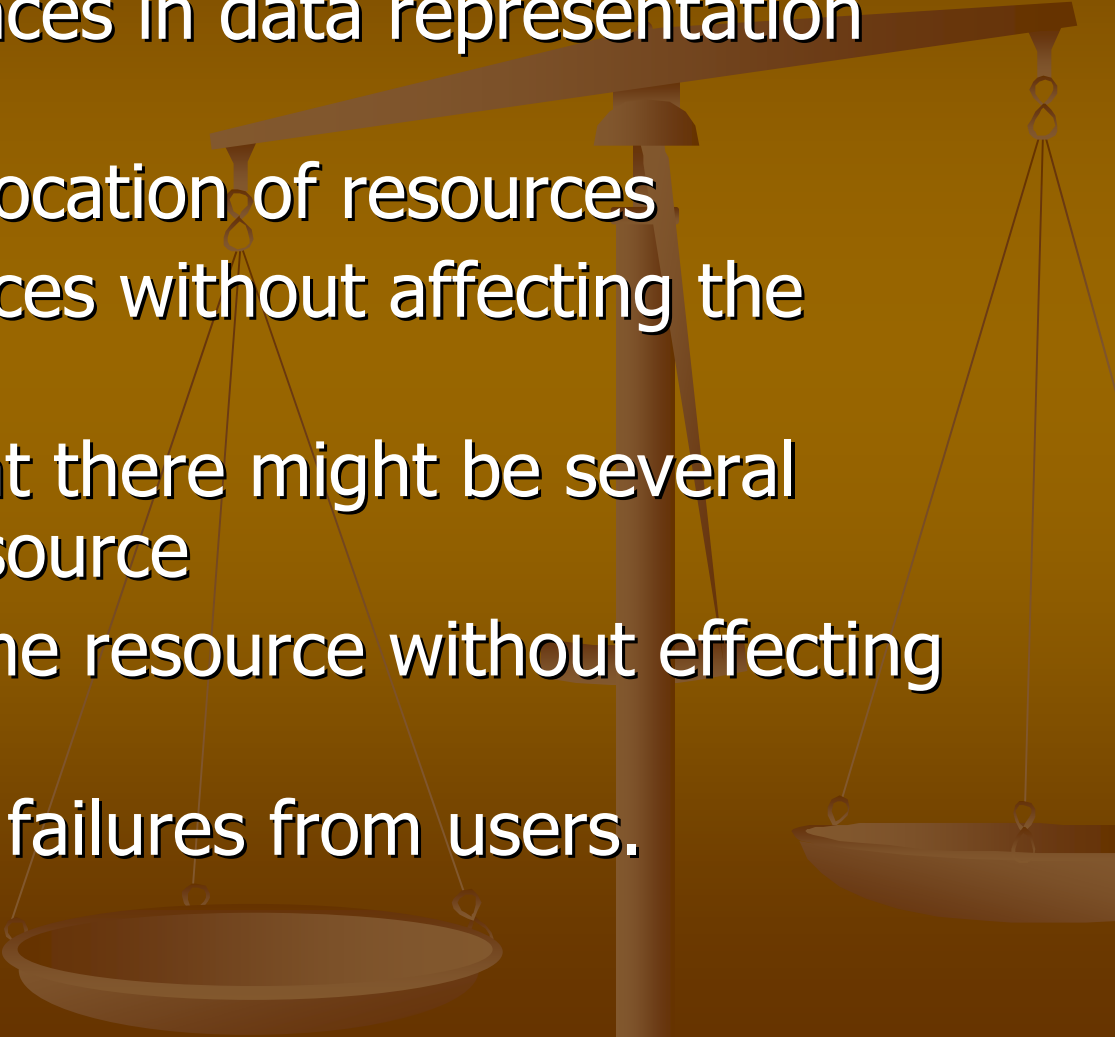We can divide processes among the nodes

How does it work?

- An agent running on a processing client detects when the system is idle, notifies the management server that the system is available for processing.

- The client then receives an application package from the server and runs the software when it has spare CPU cycles, and sends the results back to the server

Resource Sharing

- The main reason for creating a distributed system is to be able to share resources among different users.
  - Printers, memories, even CPU cycles
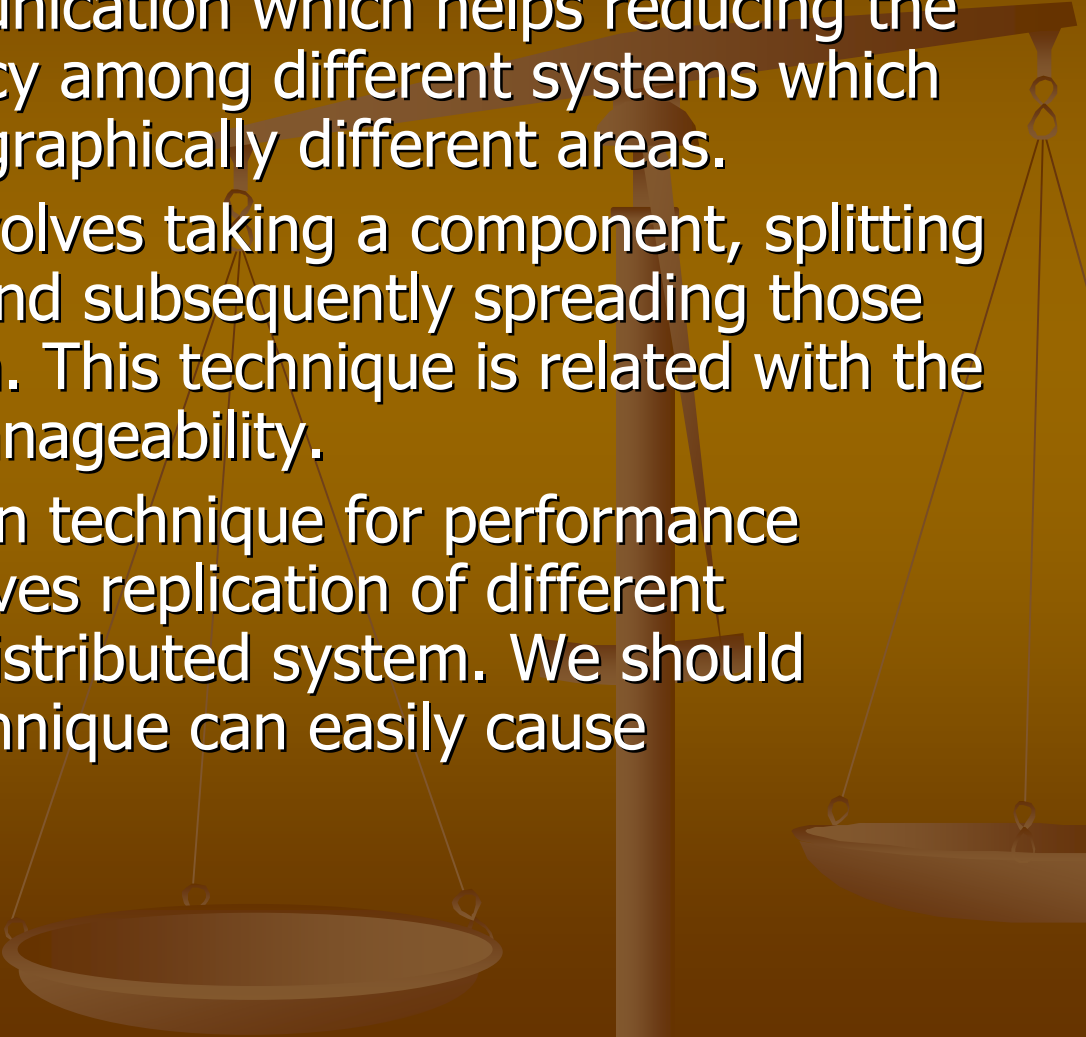- Sharing causes security problems
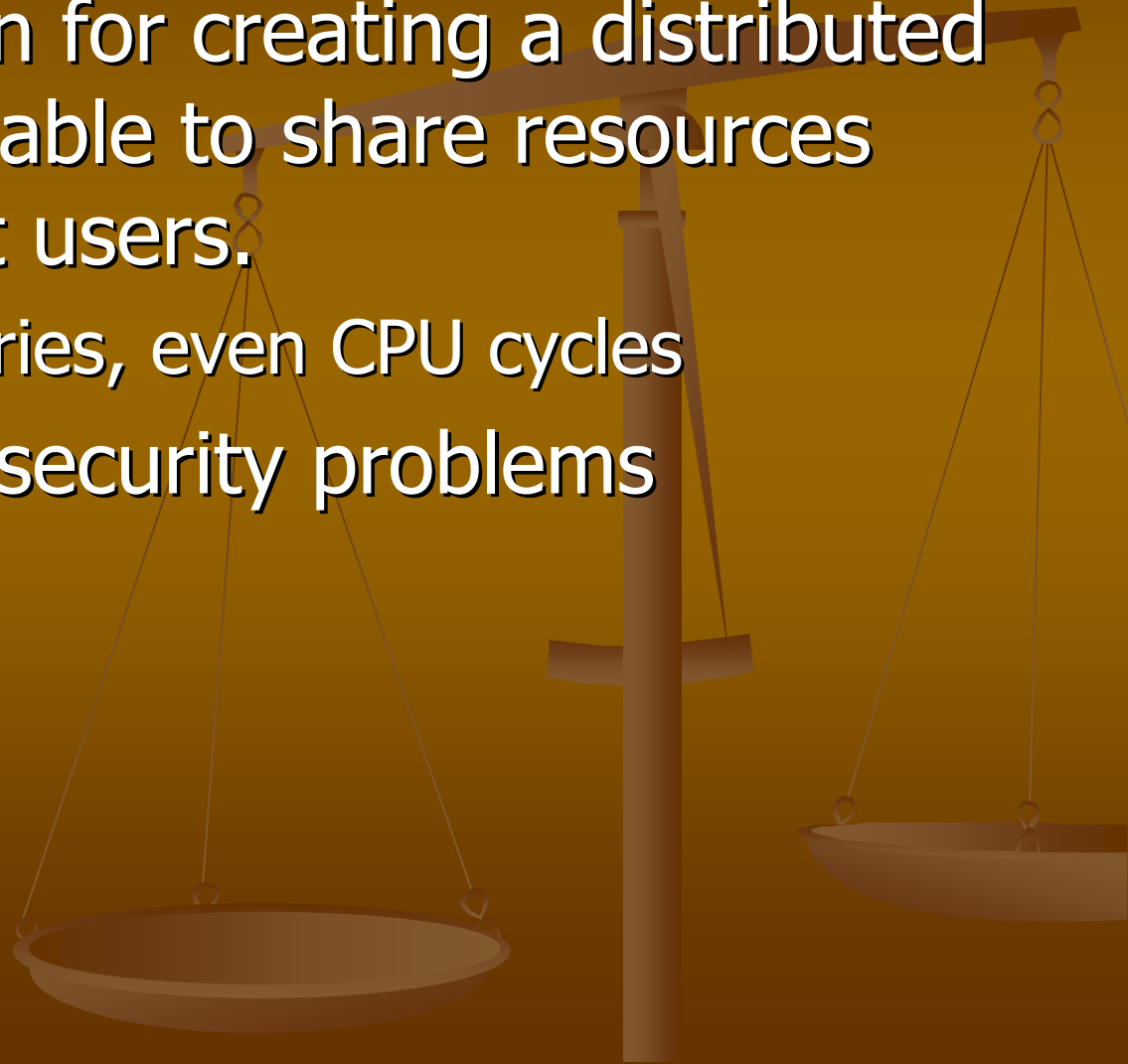
Transparency

- Hiding the differences in data representation and data access

- Hiding the actual location of resources

- Moving the resources without affecting the access

- Hiding the fact that there might be several copies of same resource

- Let user share same resource without effecting each other

- Hiding the system failures from users.

Openness

- Creating standard rules which will describe the syntax and semantics of services.
- Interoperability and portability of the products can be achieved this way
 - Example? Ports
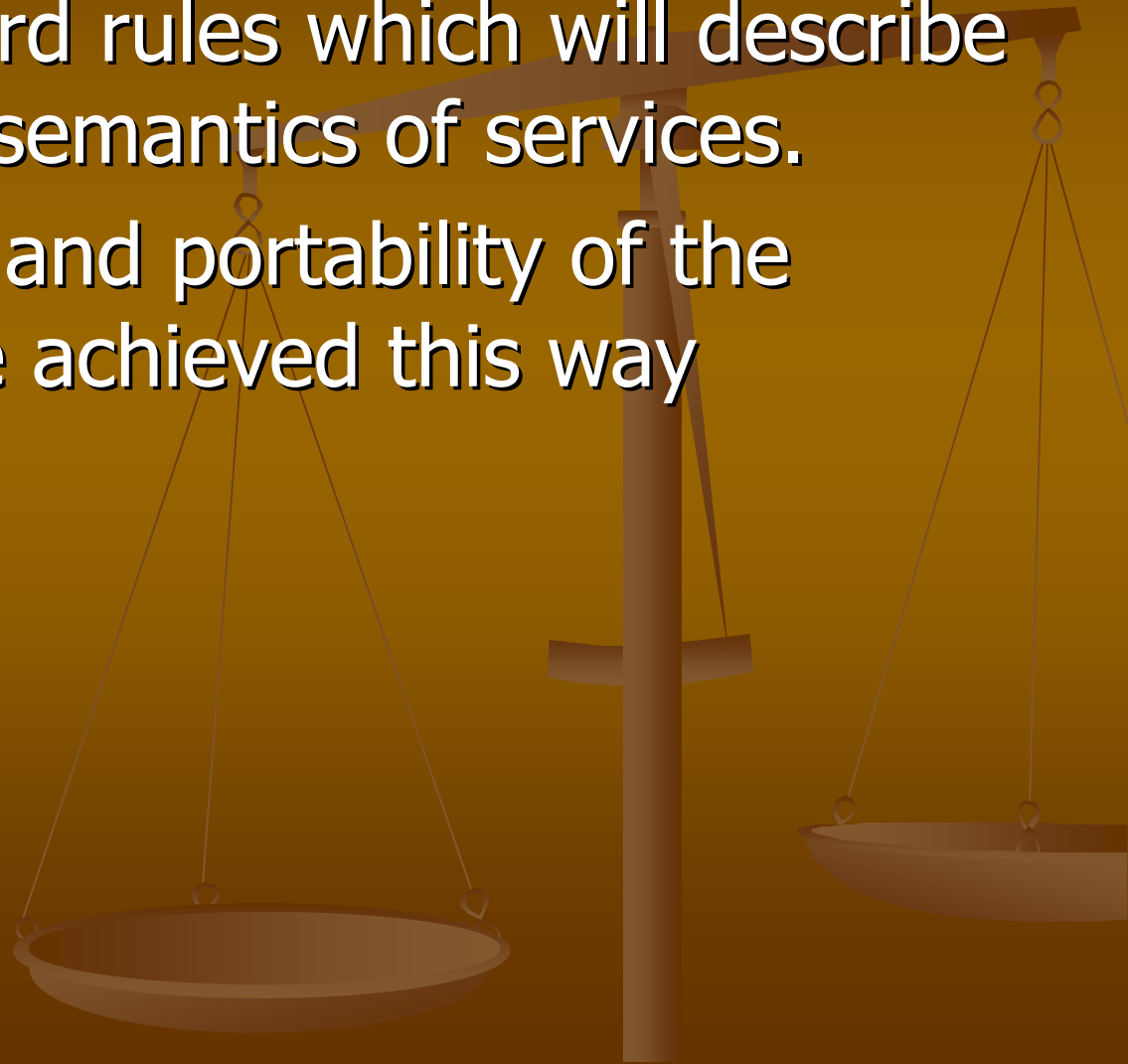
Scalability

- Asynchronous communication which helps reducing the communication latency among different systems which are populated in geographically different areas.

- Distribution which involves taking a component, splitting it into smaller parts and subsequently spreading those parts across a system. This technique is related with the problems scalable manageability.

- Caching is the solution technique for performance problems which involves replication of different components across distributed system. We should mention that this technique can easily cause inconsistency.
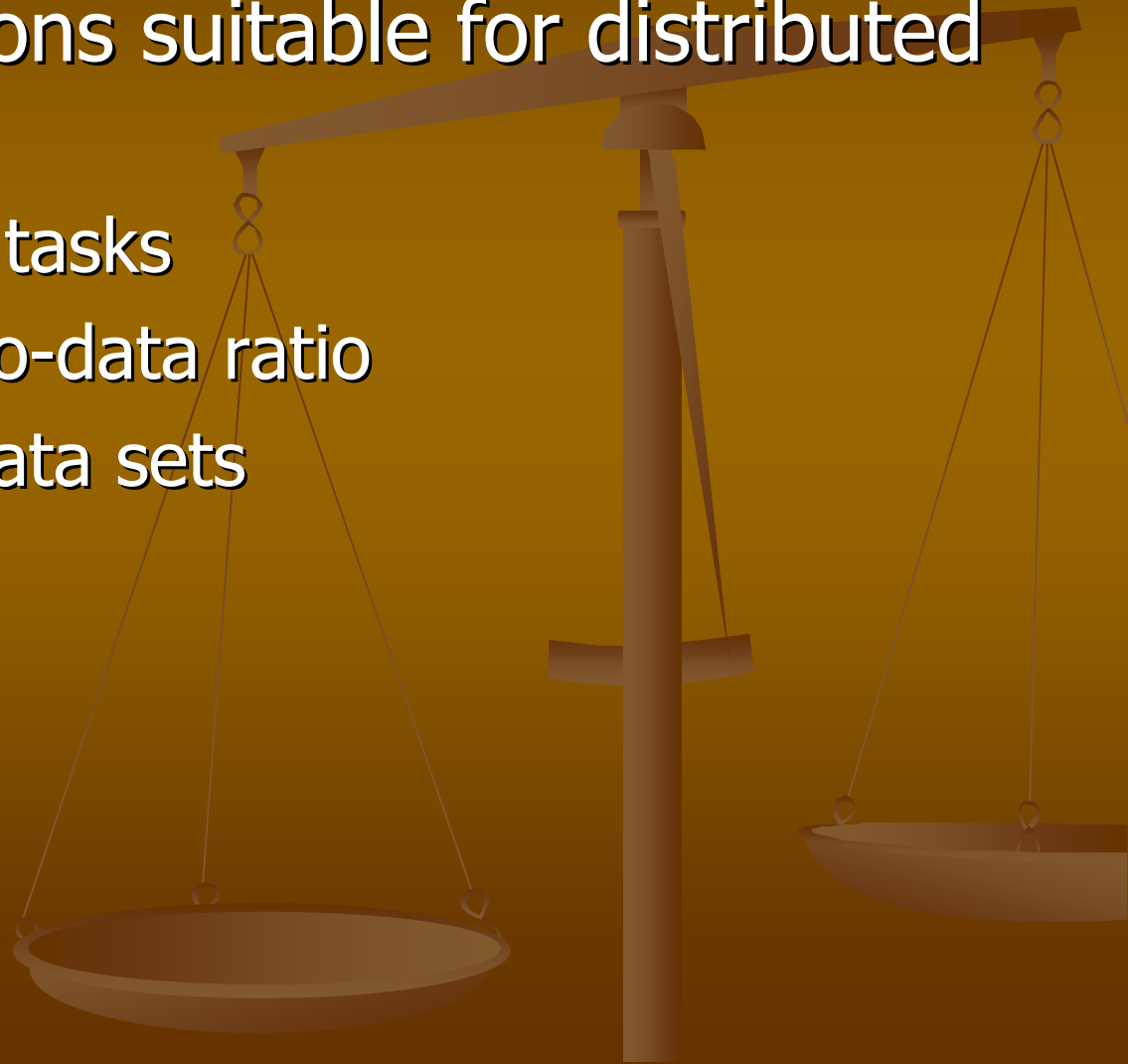
Middleware

- Middleware refers to a layer of software that resides above a network and it supports the development of distributed applications.

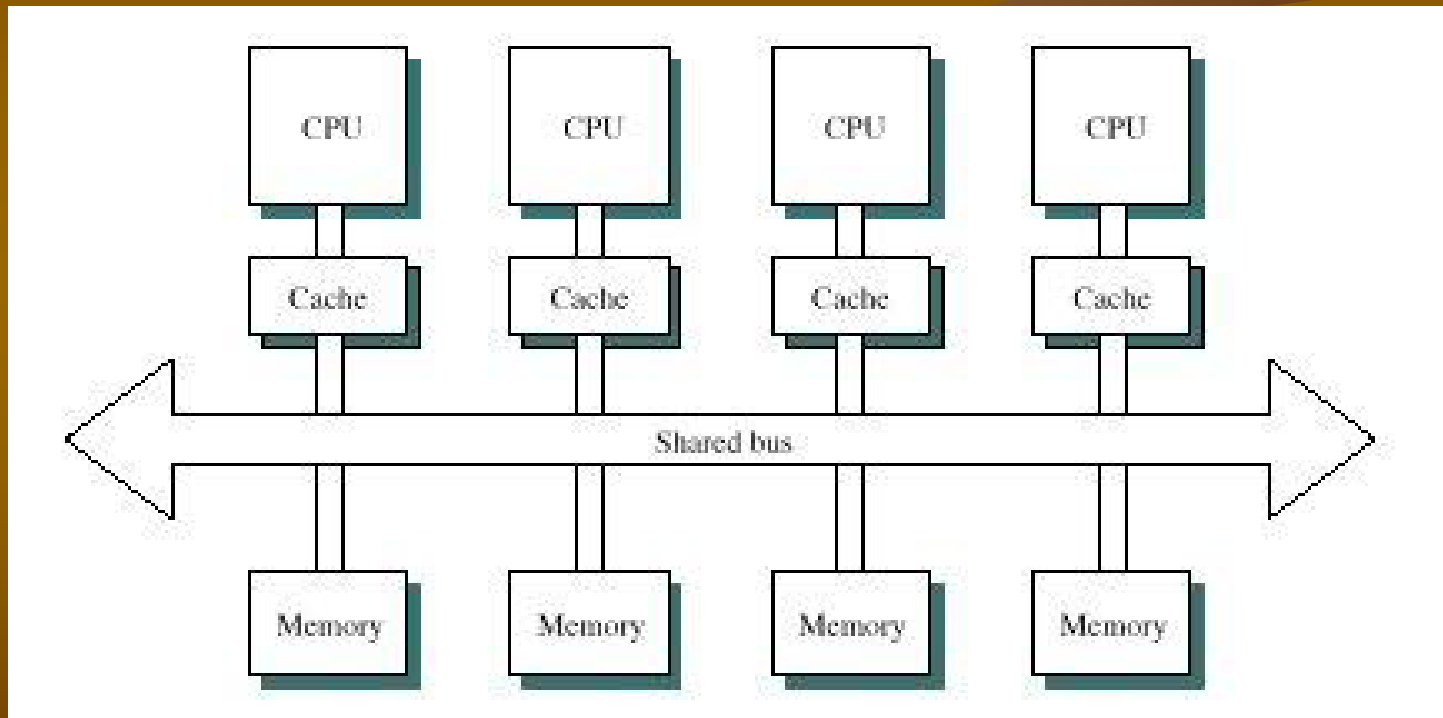- Applications can be deployed on the nodes which are part of the system.
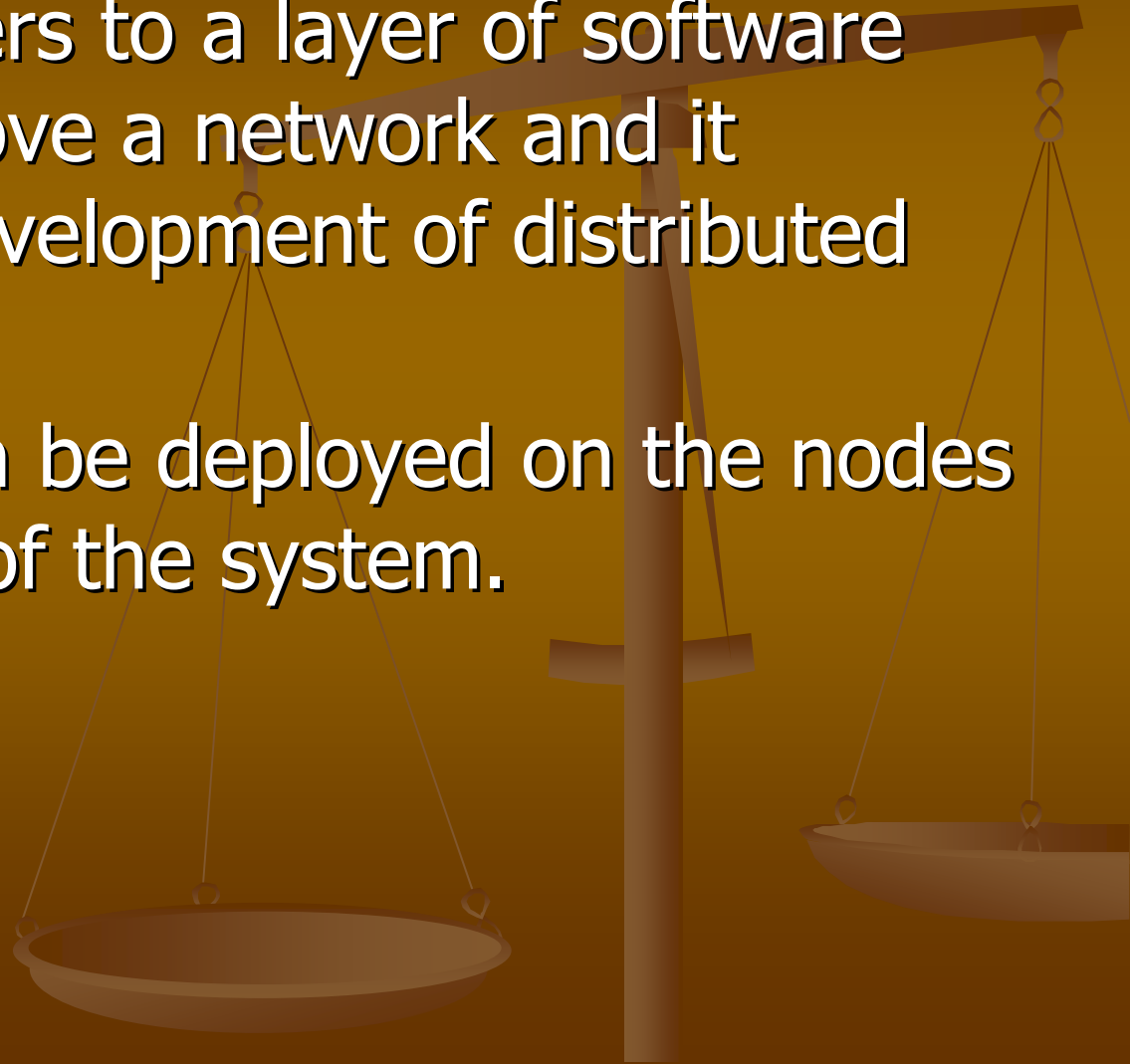
Applications

- Not all applications suitable for distributed computing.
    - Non-sequential tasks
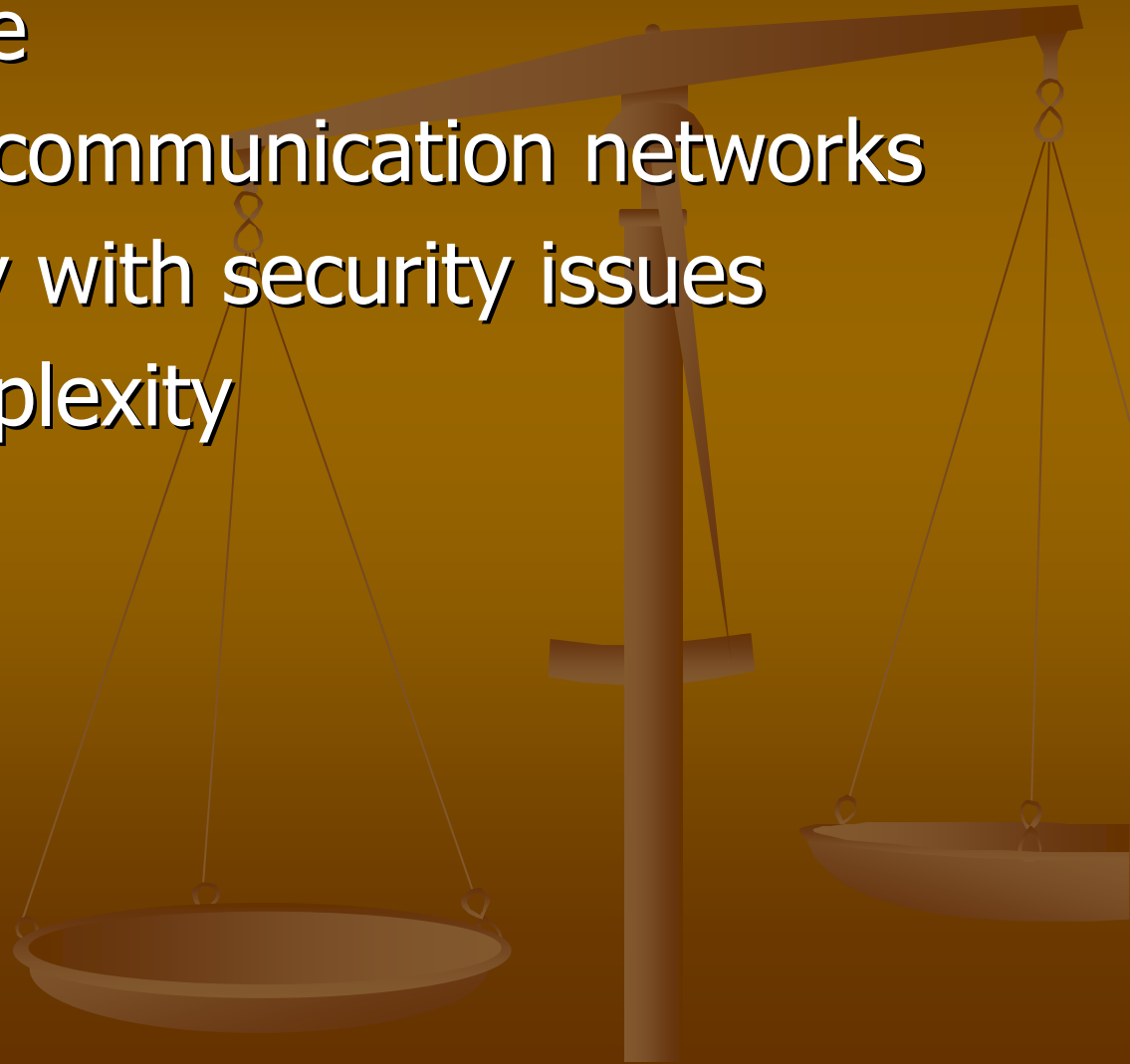   - high compute-to-data ratio
    - huge amount data sets

Shared Memory and Multi Processor Analogy

Disadvantages of Distributed Systems

- Limited software
- Depend on the communication networks
- Limited capacity with security issues
- Adds extra complexity

Conclusion

- Why it is good to research?
- Can advantages overcome disadvantages?