Distributed Systems

Dr. Y. V. Lokeswari
ASP / CSE
SSN College of Engineering

Agenda

- Introduction to Distributed Systems
- Characteristics of Distributed Systems
- Distributed System Model
- Motivation for Distributed Systems

Introduction to Distributed Systems

- A distributed system is a collection of **independent entities that cooperate** to **solve a problem** that **cannot be individually solved**.
- **Definition**: Distributed system is one in which hardware or software components located at networked computers communicate and coordinate their actions only by passing messages.
- Computers are **semi-autonomous and are loosely coupled** while they cooperate to address a problem collectively.

Introduction to Distributed Systems

- Autonomous processors communicating over a communication network.
- **Some characteristics**
  - ❖ No common physical clock
  - ❖ No shared memory
  - ❖ Communicate by a messages passing over a communication network.
  - ❖ Each computer has its own memory and runs its own operating system.
  - ❖ Geographical separation
  - ❖ Autonomy and heterogeneity
  - ❖ Independent Failure is natural in Distributed Systems
    - o Faults in the network result in the isolation of the computers.
    - o Failure of a computer is not immediately made known to the other components with which it communicates.
  - ❖ Concurrent program execution

Distributed System Model

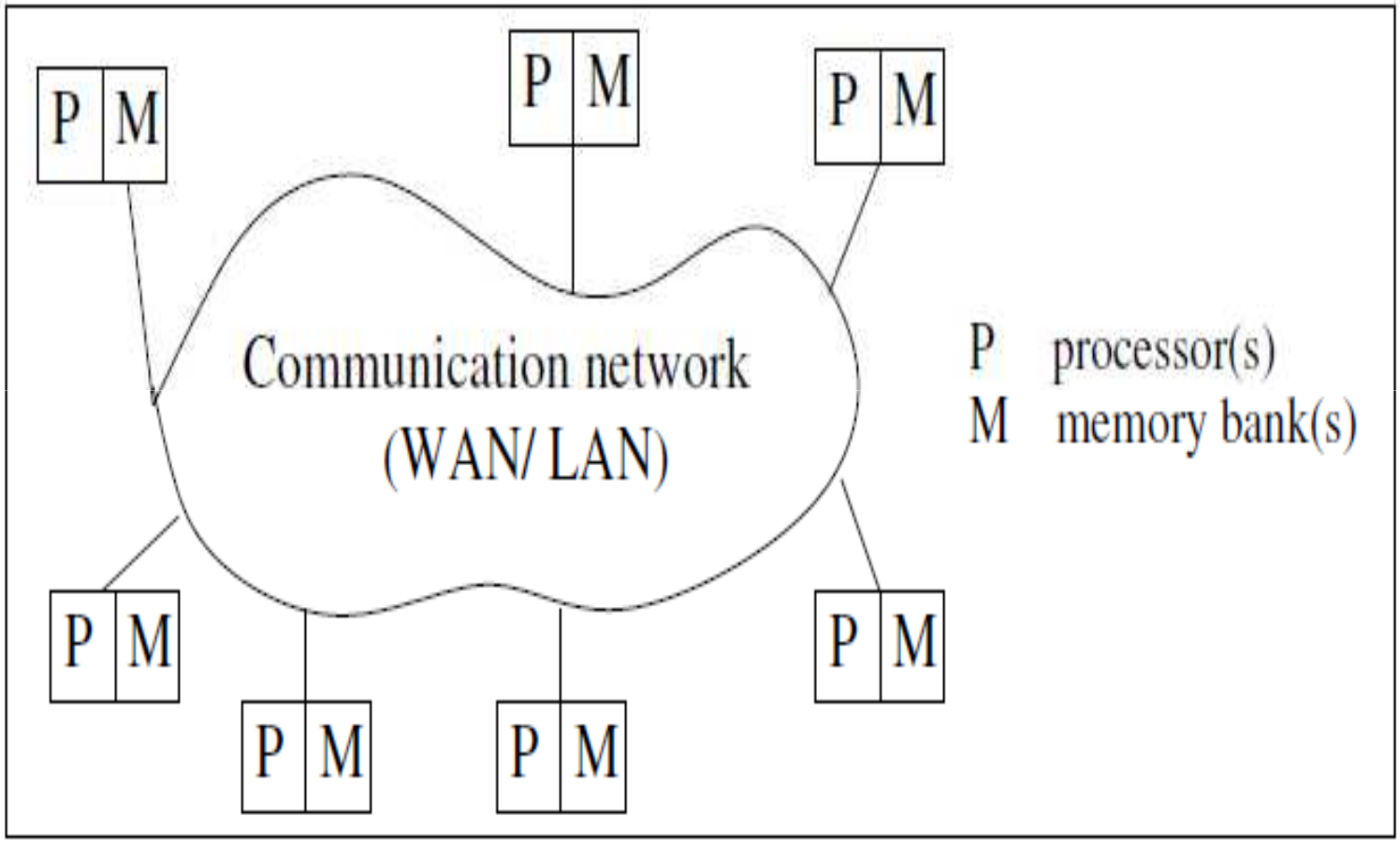

Figure 1.1: A distributed system connects processors by a communication network.

Relation Between Software Components

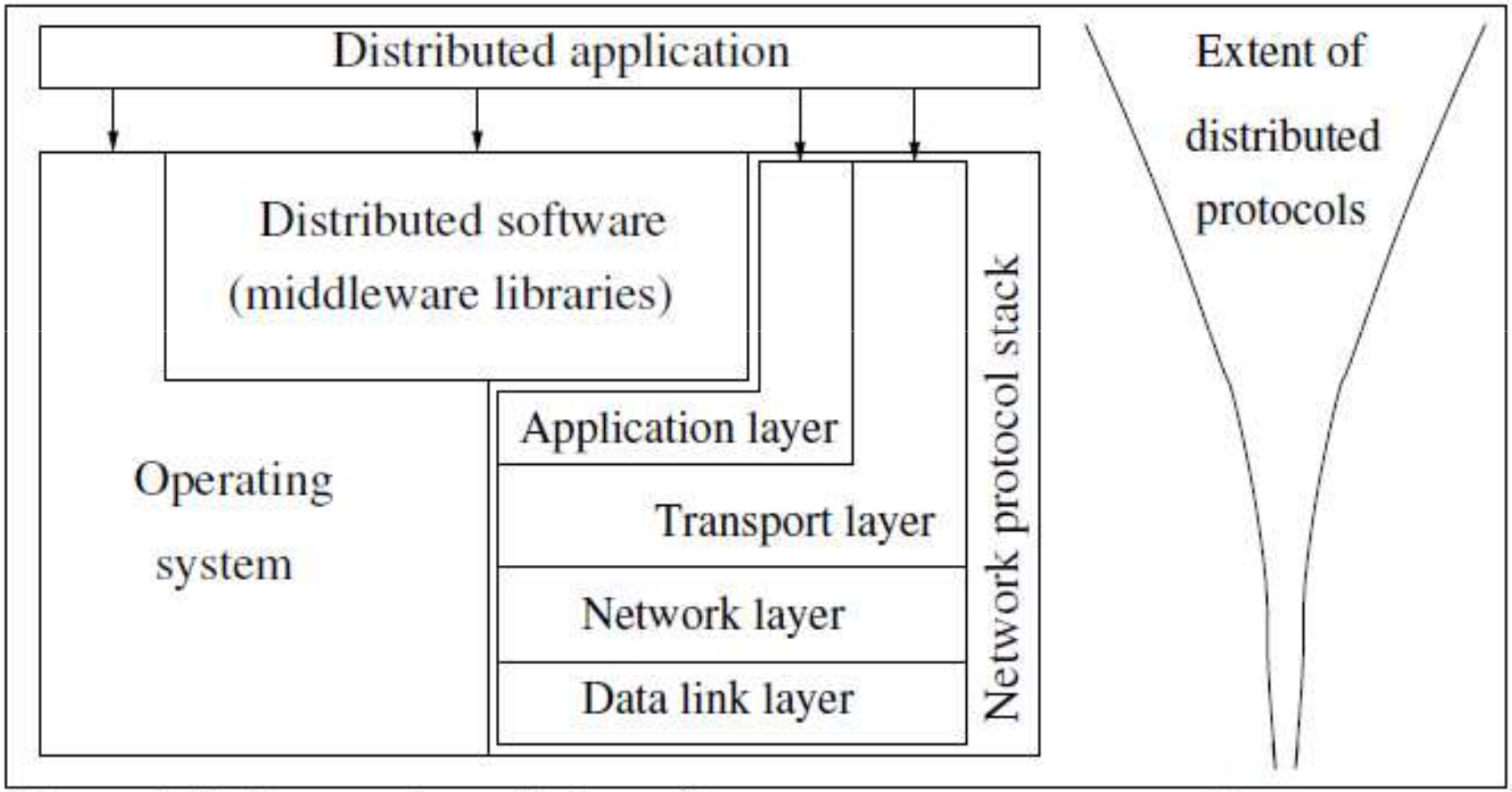

Figure 1.2: Interaction of the software components at each process.

Motivation for Distributed Systems

- **Inherently distributed computation**
  - Money transfer in banking.
- **Resource sharing**
  - Data in DBs, special libraries, data, files cannot be replicated.
  - Distributed DB
- **Access to geographically remote data & resources**
  - Replication of data is not always possible (data is too large and sensitive)
  - Eg: Payroll Data is too large and sensitive to replicate to every branch.
- **Increased performance/cost ratio**
  - Due to resource sharing, partitioning task across various computers.
- **Reliability**
  - Availability, integrity, fault-tolerance
- **Scalability**
  - Adding more processors to the WAN is not difficult
- **Modularity and incremental expandability**
  - Heterogeneous processors can be easily added without affecting performance.
  - Existing processors can also be easily replaced by others.

Summary

- Introduction
- Characteristics
- Motivation

Thank You