

# **Distributed Computing (Last Minute Revision)**

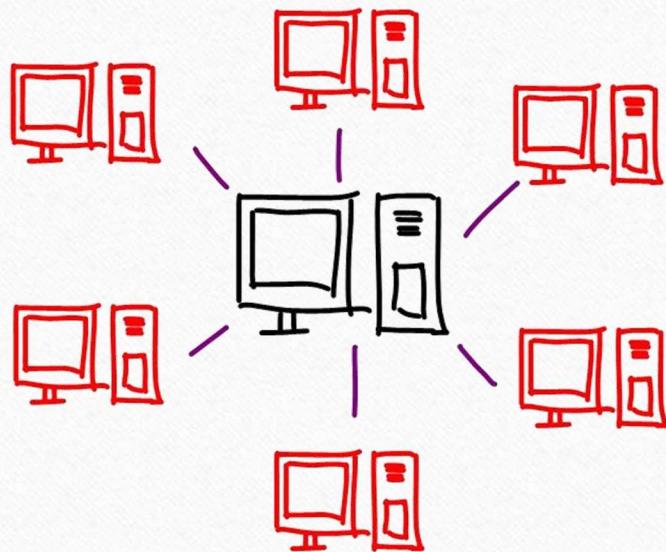
## **Chapter 1: Fundamentals**

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*N Department: Computer Engineering*

*College: Vidyalankar Institute of Technology*

# Distributed Computing



A ***distributed system***, also known as **distributed computing**, is a system with multiple components located on different machines that communicate and coordinate actions in order to appear as a single ***coherent system*** to the end-user

# Distributed computing components

## Hardware

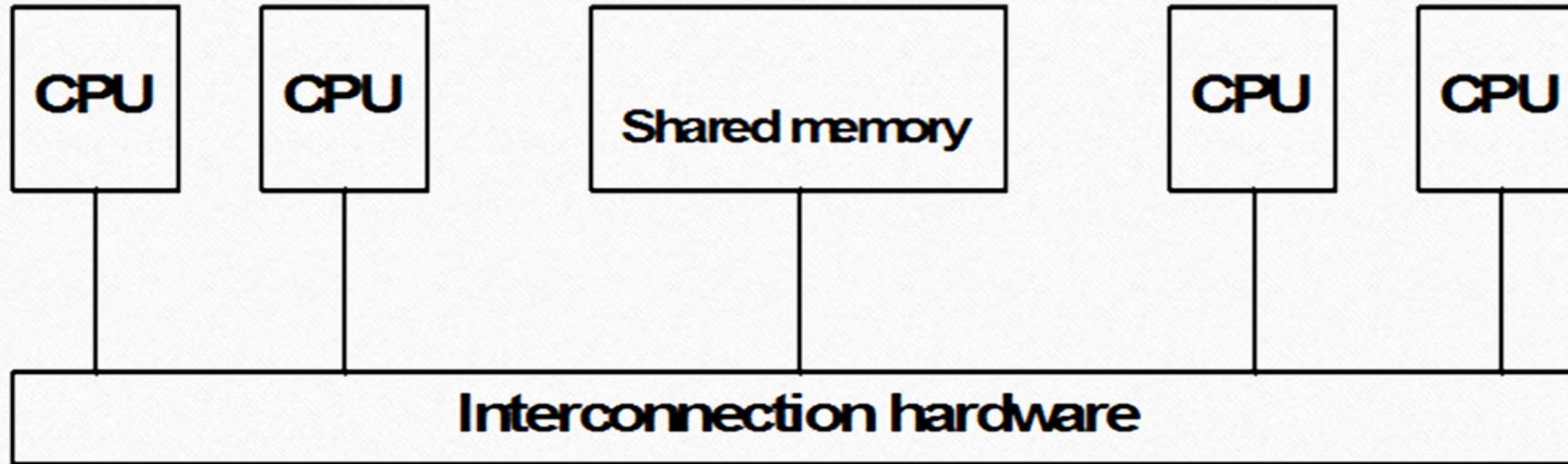
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- **Tightly Coupled**
- **Loosely Coupled**

## Software

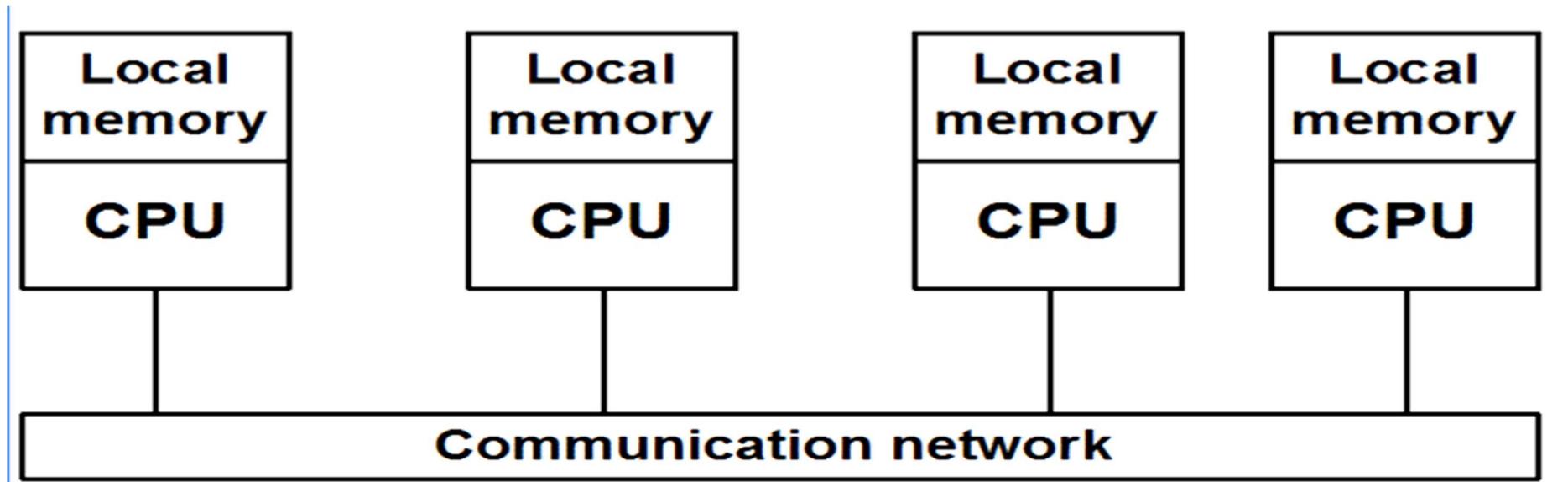
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- **DOS**
- **NOS**
- **Middleware**



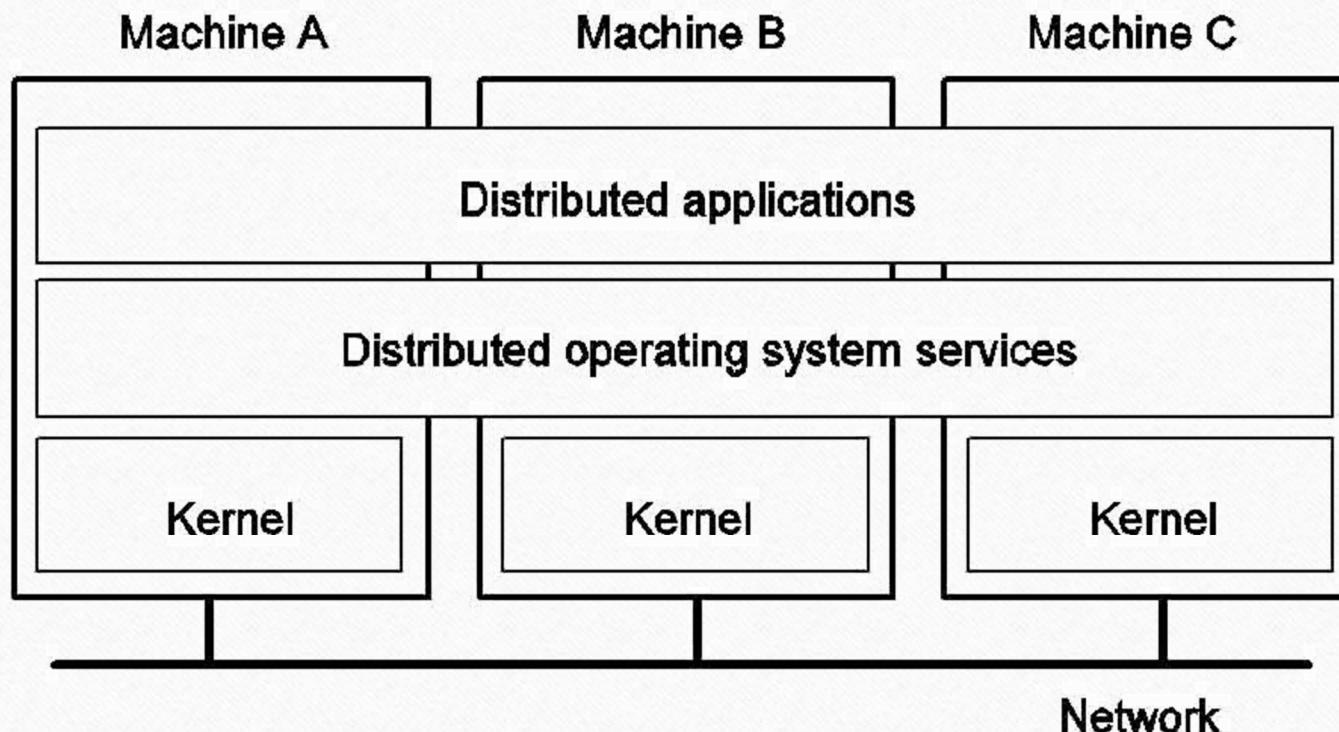
Source: A.S. Tanenbaum & M.V. Steen, *Distributed Systems: Principles and Paradigms*

# Tightly Coupled



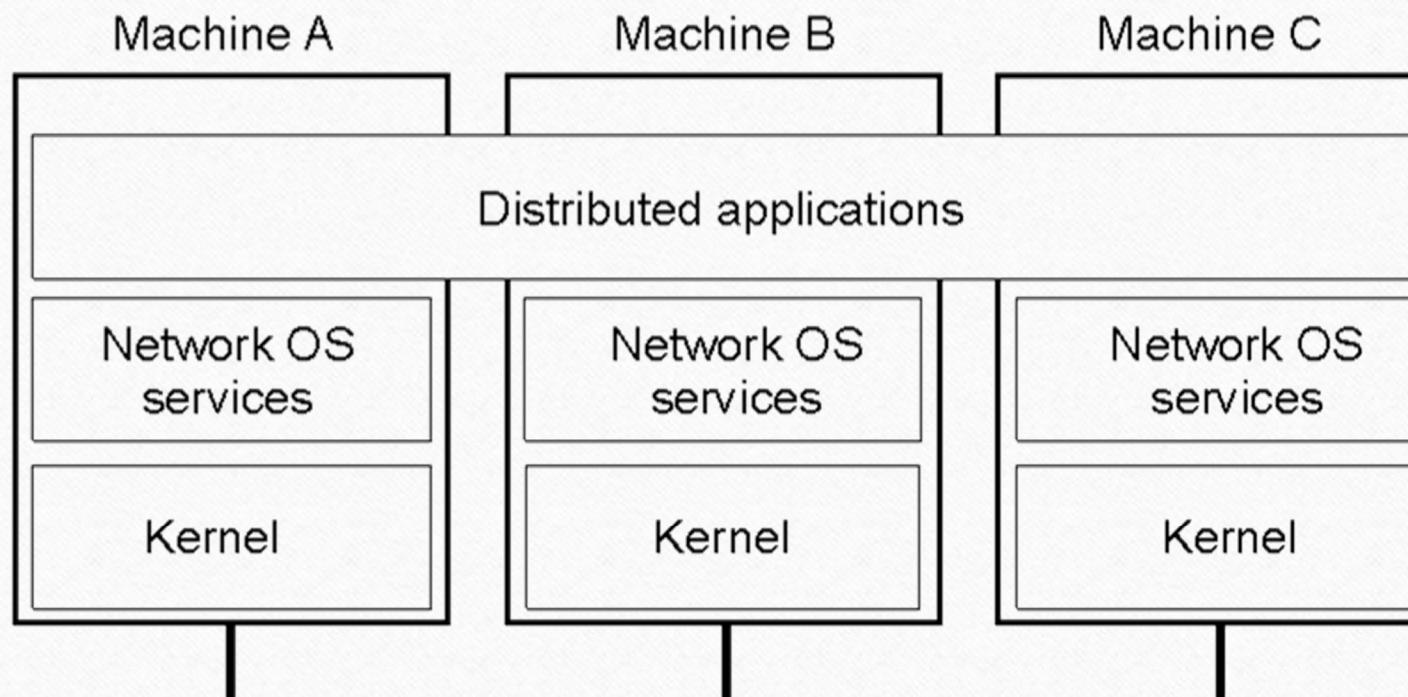
Source: A.S. Tanenbaum & M.V. Steen, *Distributed Systems: Principles and Paradigms*

# Loosely Coupled



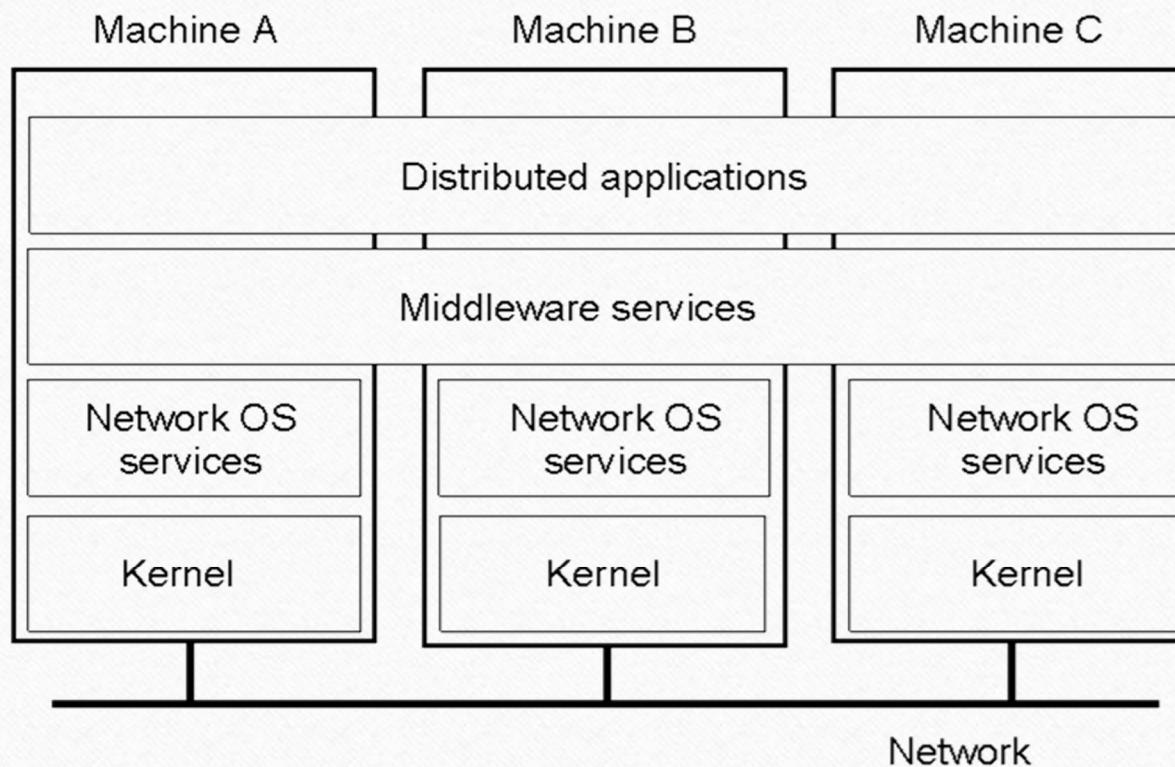
Source: A.S. Tanenbaum & M.V. Steen, Distributed Systems: Principles and Paradigms

# DOS



Source: A.S. Tanenbaum & M.V. Steen, *Distributed Systems: Principles and Paradigms*

# NOS



Source: A.S. Tanenbaum & M.V. Steen, *Distributed Systems: Principles and Paradigms*

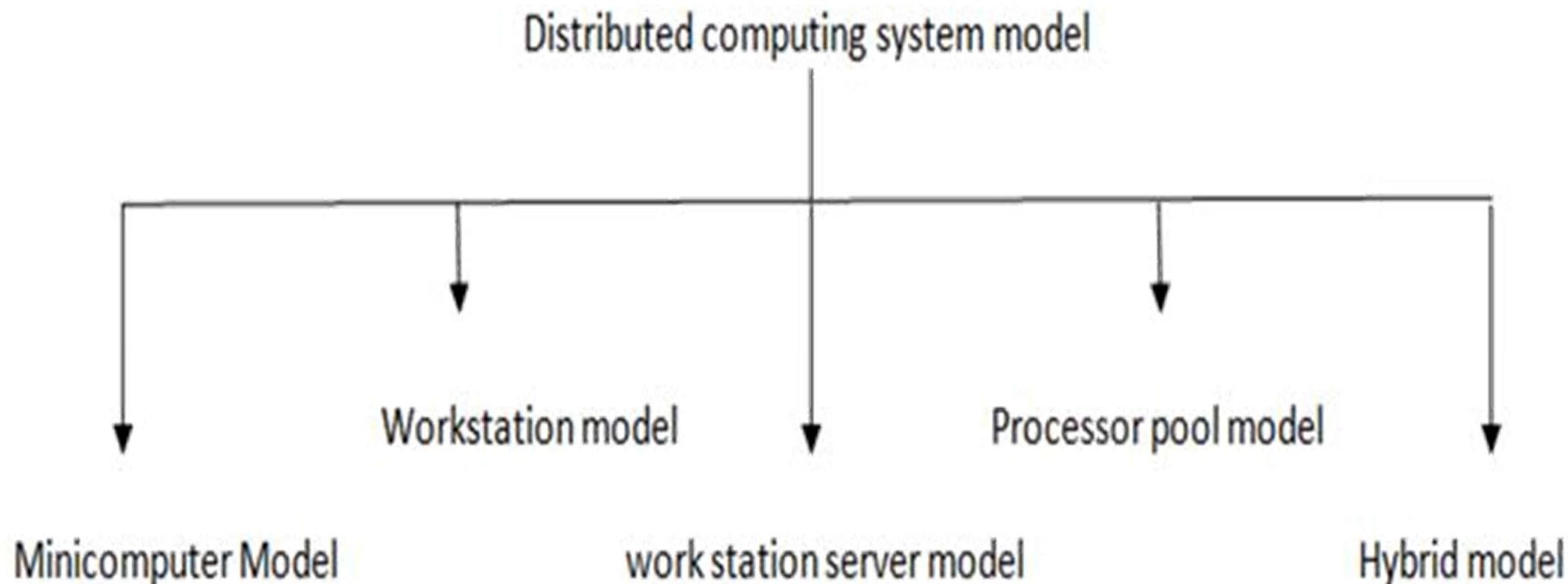
**DCE**

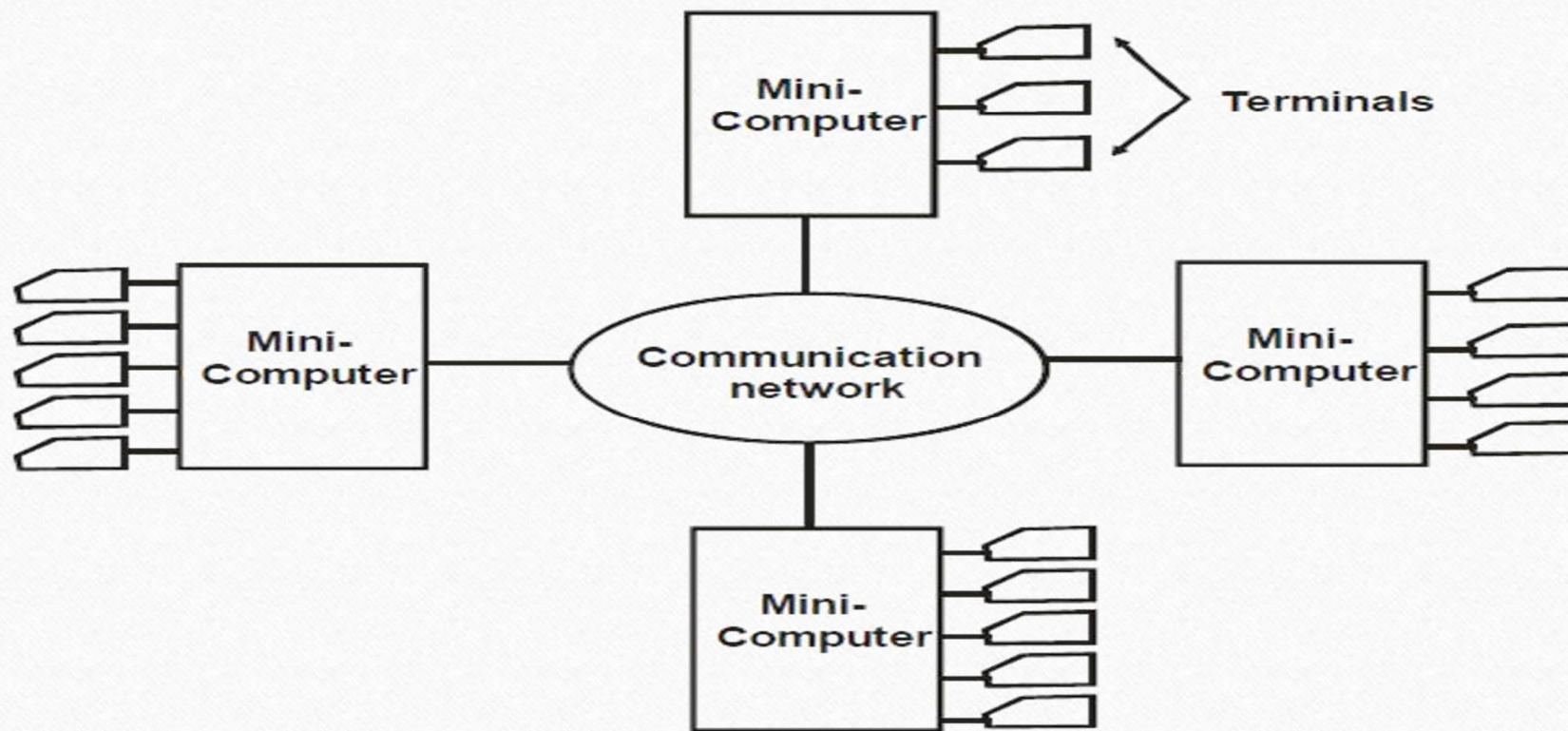
<b>Item</b>	<b>Distributed OS</b>		<b>Network OS</b>	<b>Middleware-based OS</b>
	<b>Multiproc.</b>	<b>Multicomp.</b>		
Degree of transparency	Very High	High	Low	High
Same OS on all nodes	Yes	Yes	No	No
Number of copies of OS	1	N	N	N
Basis for communication	Shared memory	Messages	Files	Model specific
Resource management	Global, central	Global, distributed	Per node	Per node
Scalability	No	Moderately	Yes	Varies
Openness	Closed	Closed	Open	Open

## **DOS vs NOS vs DCE**

# Goals of Distributed Systems

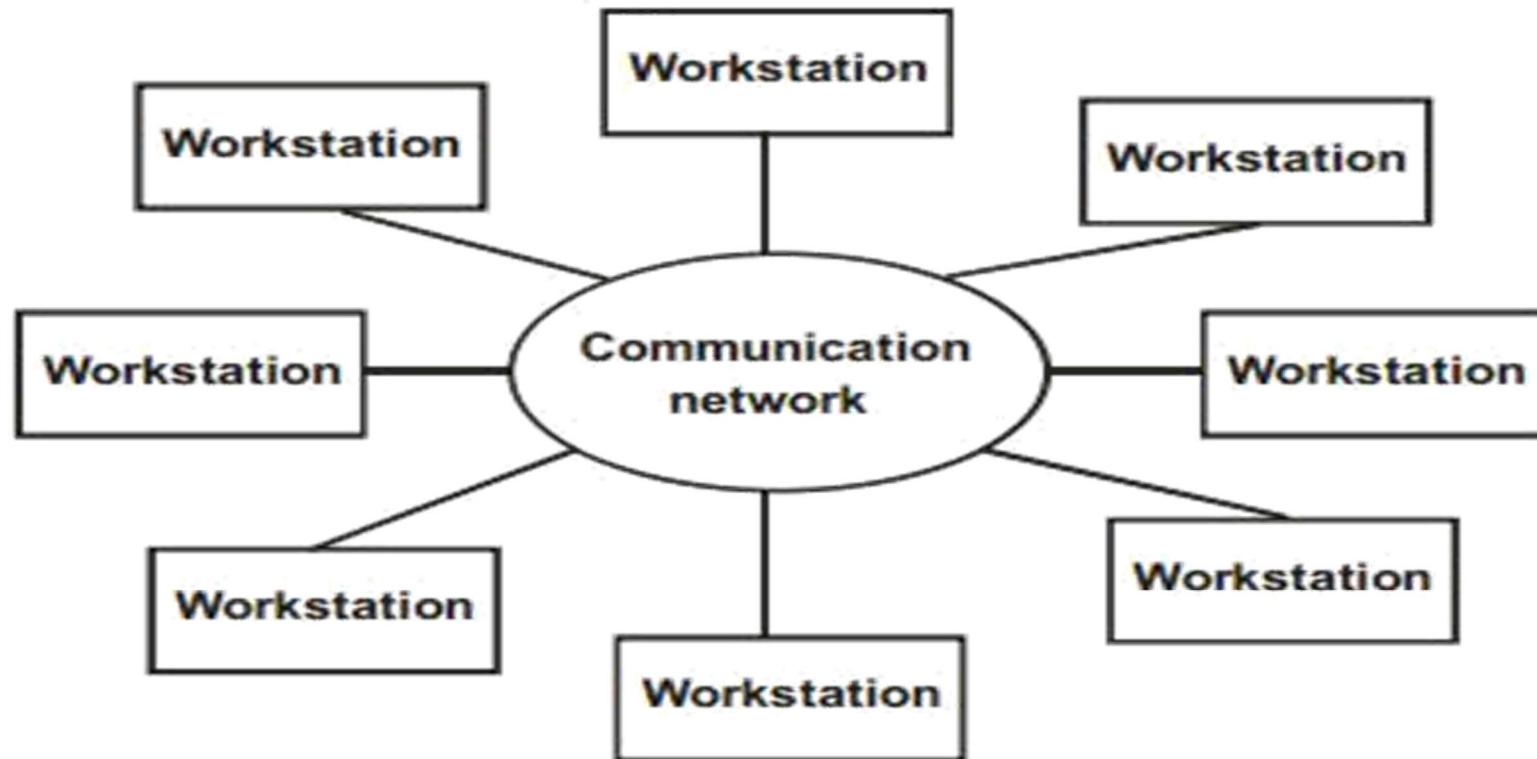
- Inherently Developed Applications
- High performance
- Low response time
- Scalability
- Flexibility
- Reliability
- Availability
- Security
- Better price performance ratio





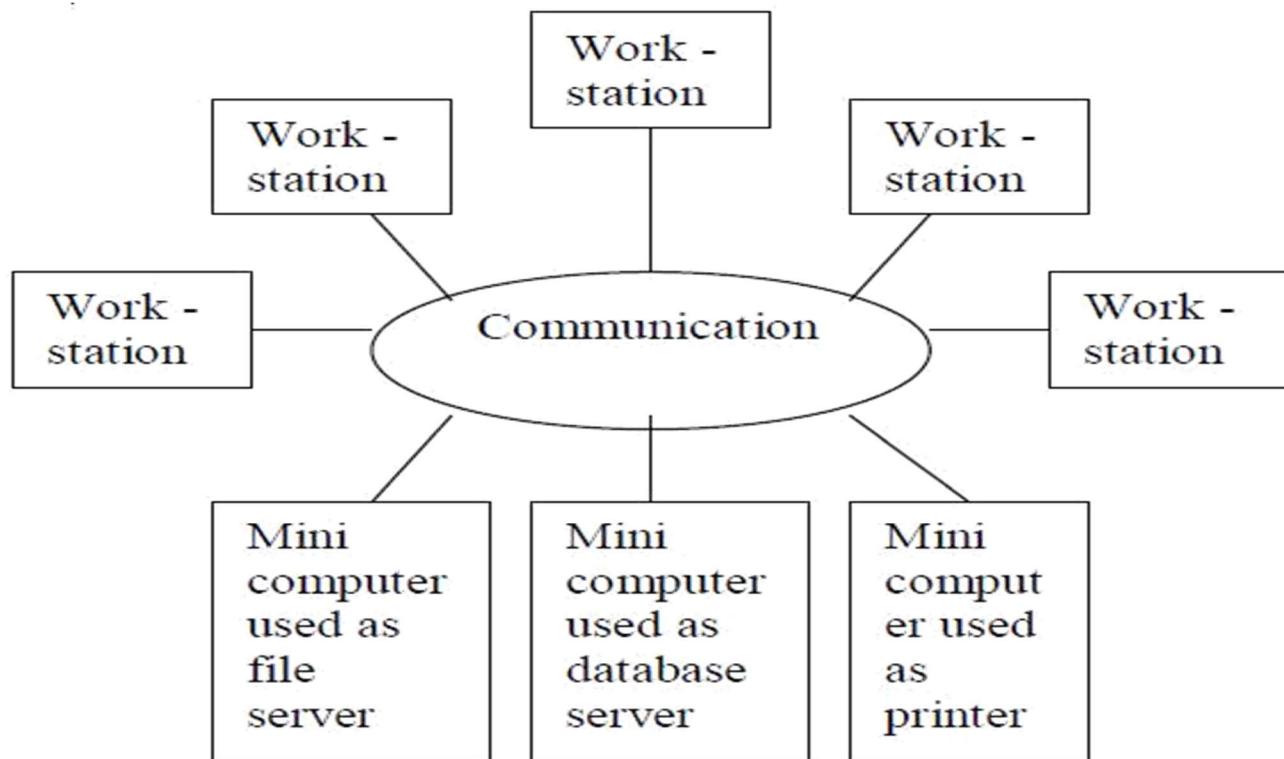
Source: A.S. Tanenbaum & M.V. Steen, Distributed Systems: Principles and Paradigms

# Mini Computer



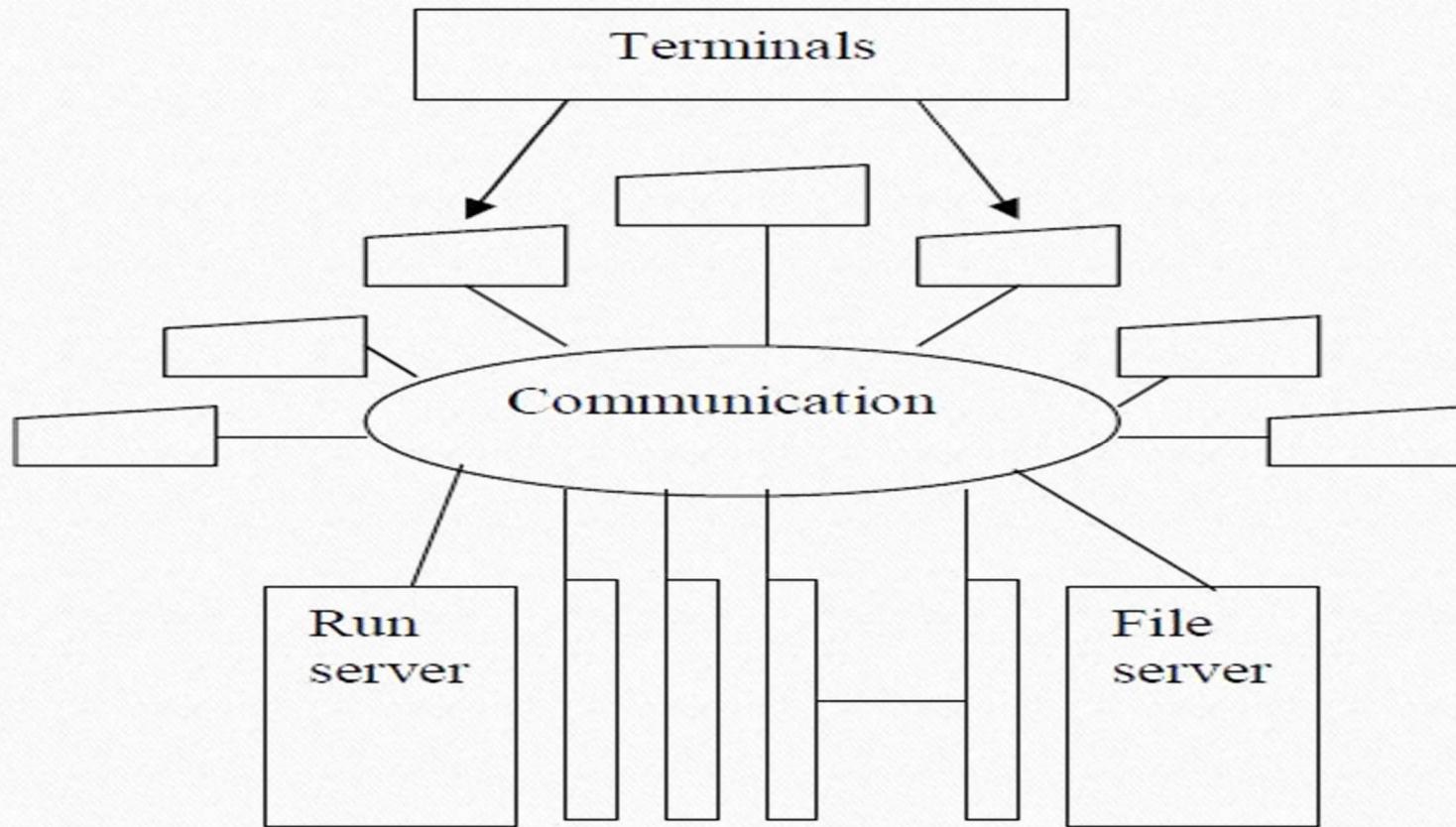
Source: A.S. Tanenbaum & M.V. Steen, Distributed Systems: Principles and Paradigms

# Workstation



Source: A.S. Tanenbaum & M.V. Steen, Distributed Systems: Principles and Paradigms

# Workstation Server



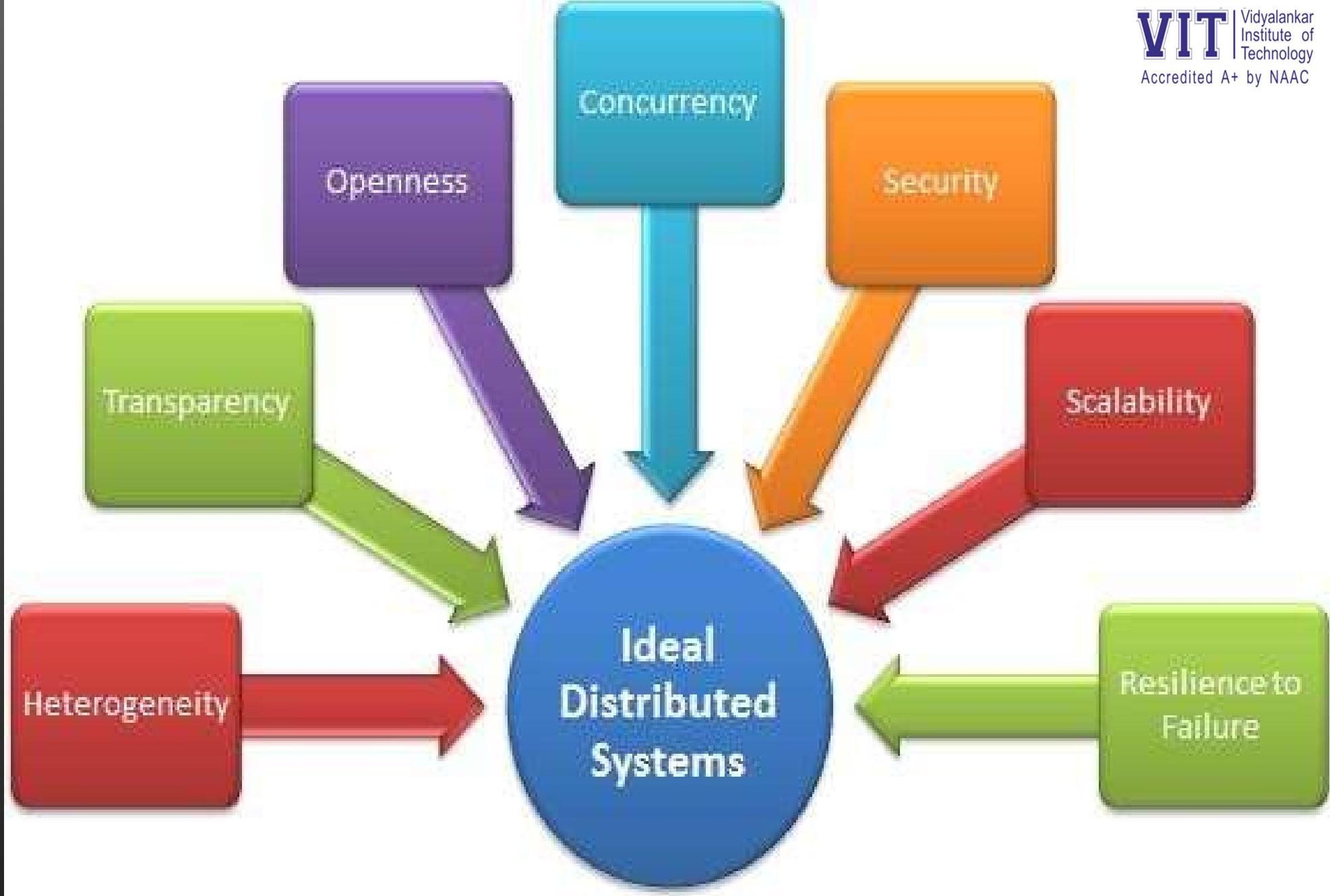
Source: A.S. Tanenbaum & M.V. Steen, Distributed Systems: Principles and Paradigms

## Processor Pool



# Hybrid

# Design Issues



Transparency	Description
Access	Hide differences in data representation and how a resource is accessed
Location	Hide where a resource is located
Migration	Hide that a resource may move to another location
Relocation	Hide that a resource may be moved to another location while in use
Replication	Hide that a resource is replicated
Concurrency	Hide that a resource may be shared by several competitive users
Failure	Hide the failure and recovery of a resource

## Transparency

## • FUNDAMENTALS

- **Definition**
- **Components**
  - **Hardware**
    - **Tightly Coupled**
    - **Loosely Coupled**
  - **Software**
    - **DOS**
    - **NOS**
    - **Middleware**
- **Goals**
- **Models**
- **Design Issues**
- **Transparency**

**Final  
Summary**

