IBM Software Group

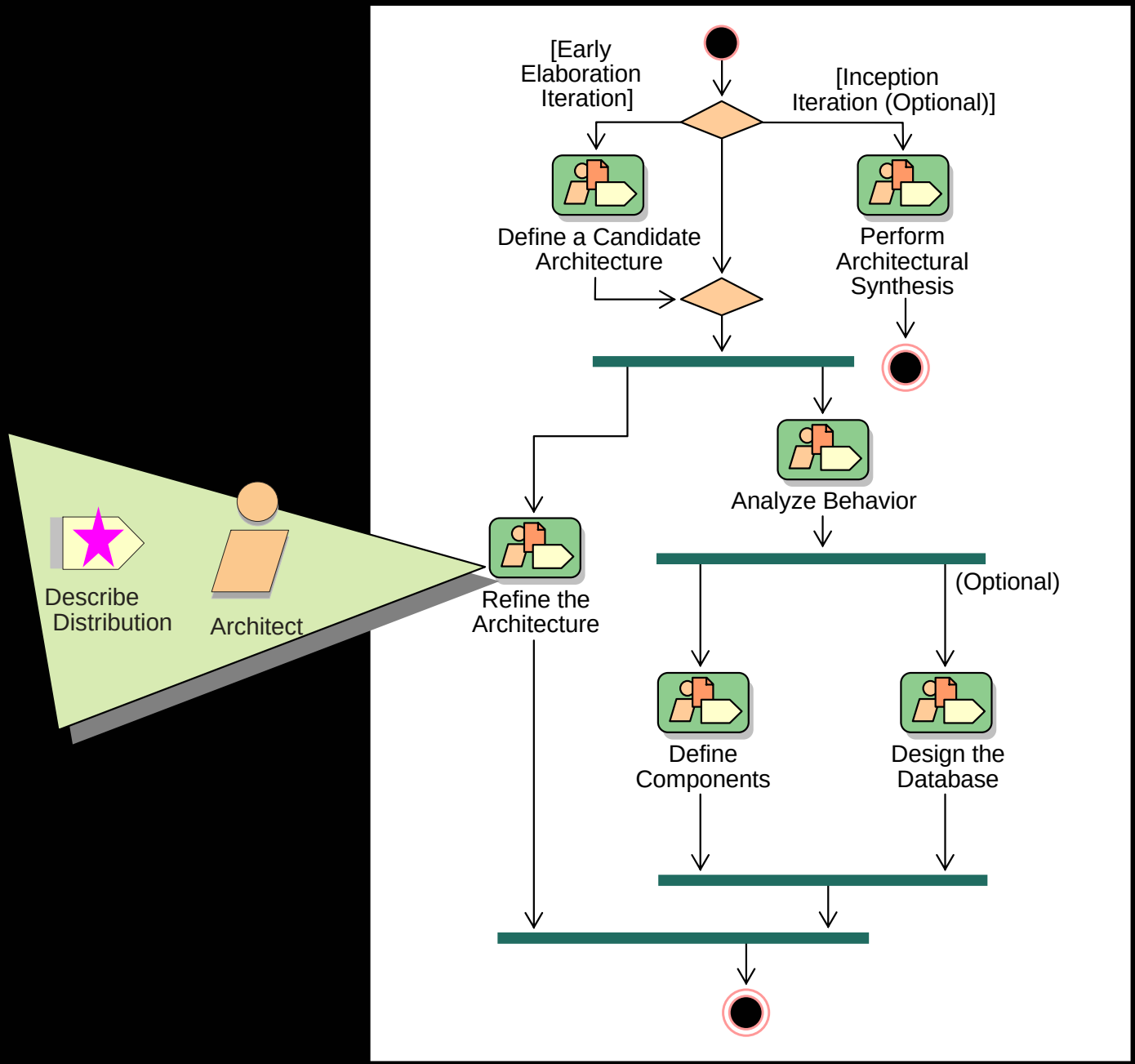
Mastering Object-Oriented Analysis and Design with UML

Module 8: Describe Distribution

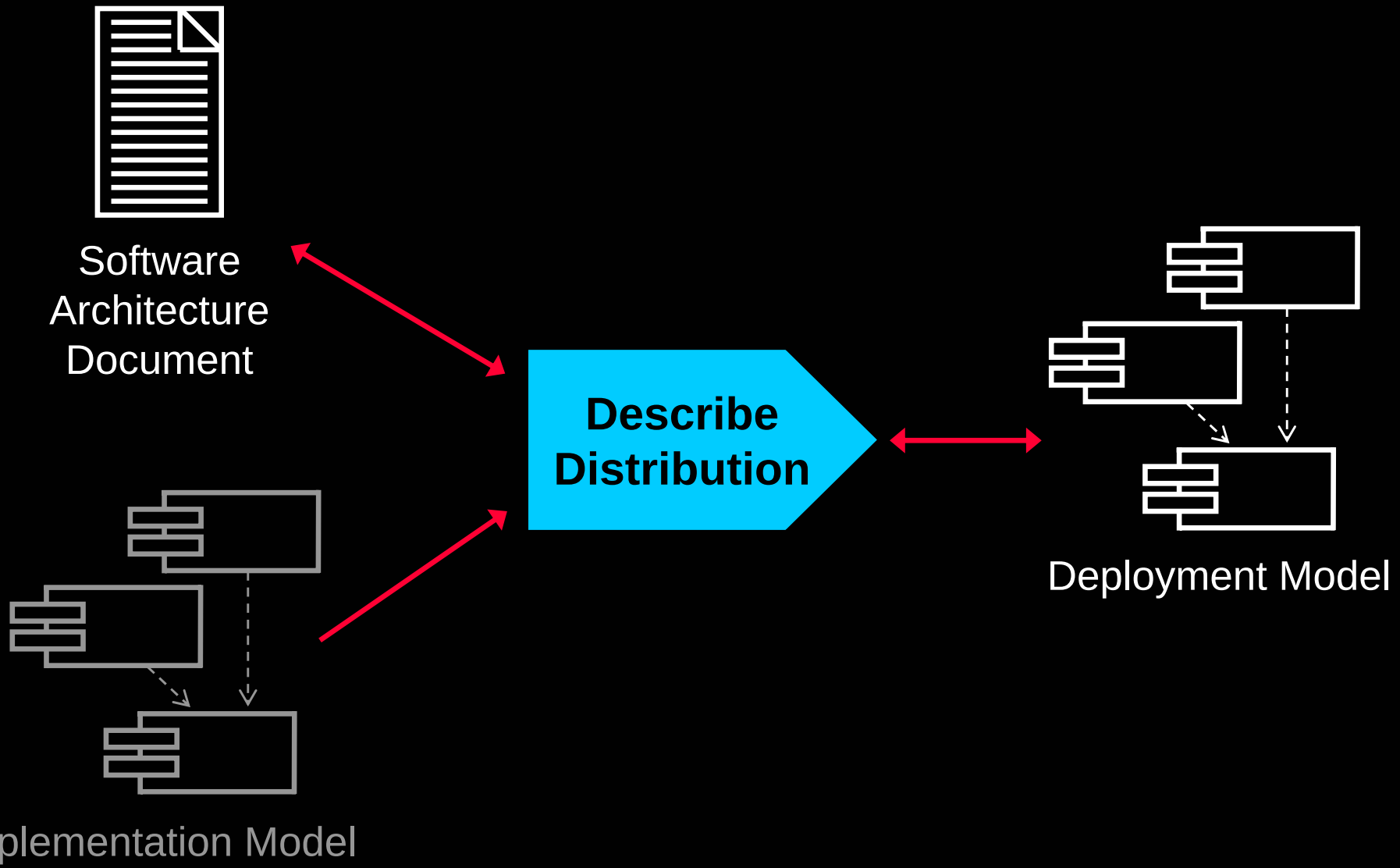
Objectives: Describe Distribution

- Explain the purpose of the Describe Distribution activity and when in the lifecycle it is performed
- Describe how the functionality of the system can be distributed across physical nodes
- Model the distribution decisions of the system in the Deployment Model
- Articulate the rationale and considerations that support the architectural decisions

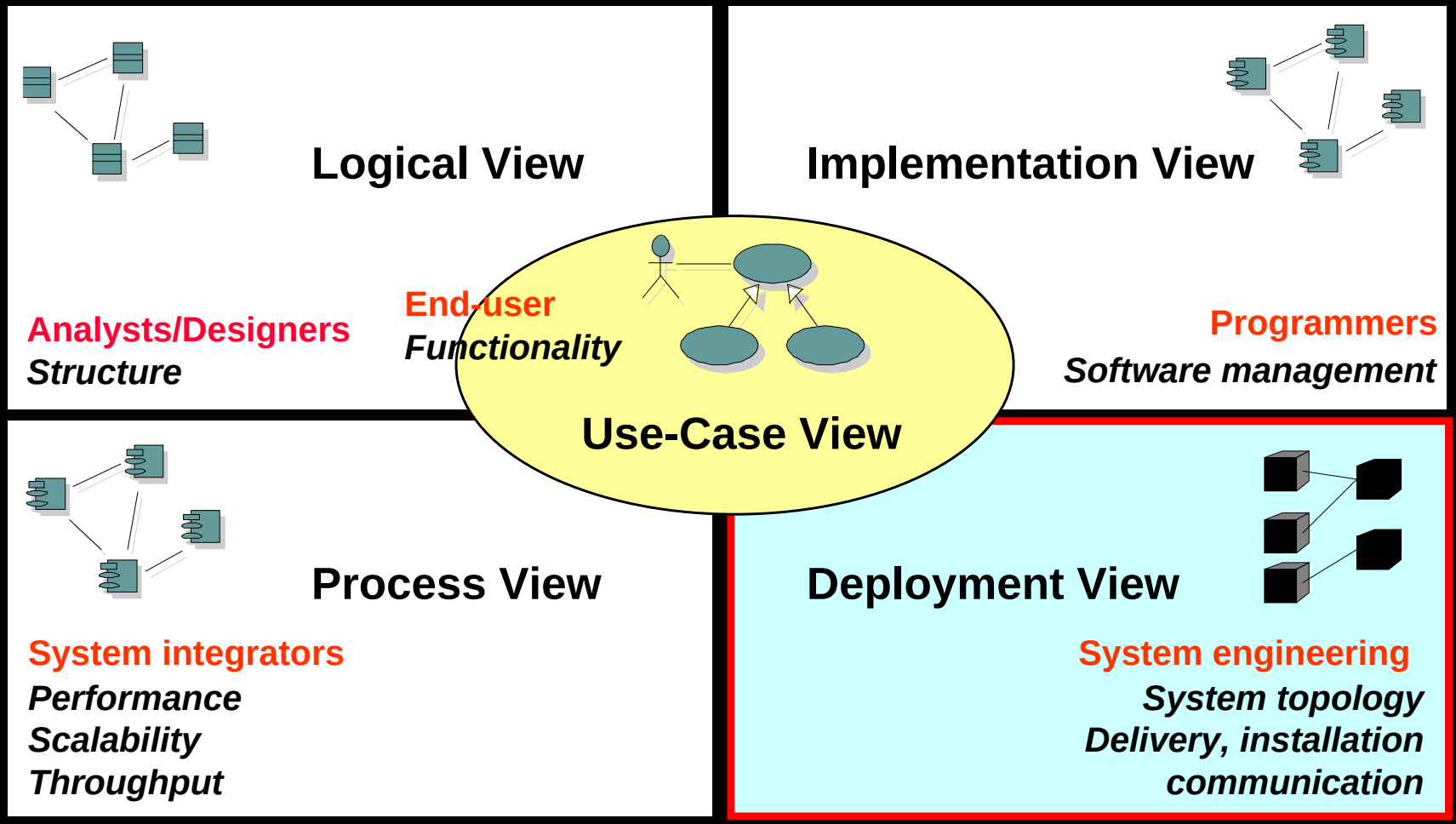
Describe Distribution in Context



Describe Distribution Overview



Key Concepts: The Deployment View



The Deployment View is an "architecturally significant" slice of the Deployment Model.

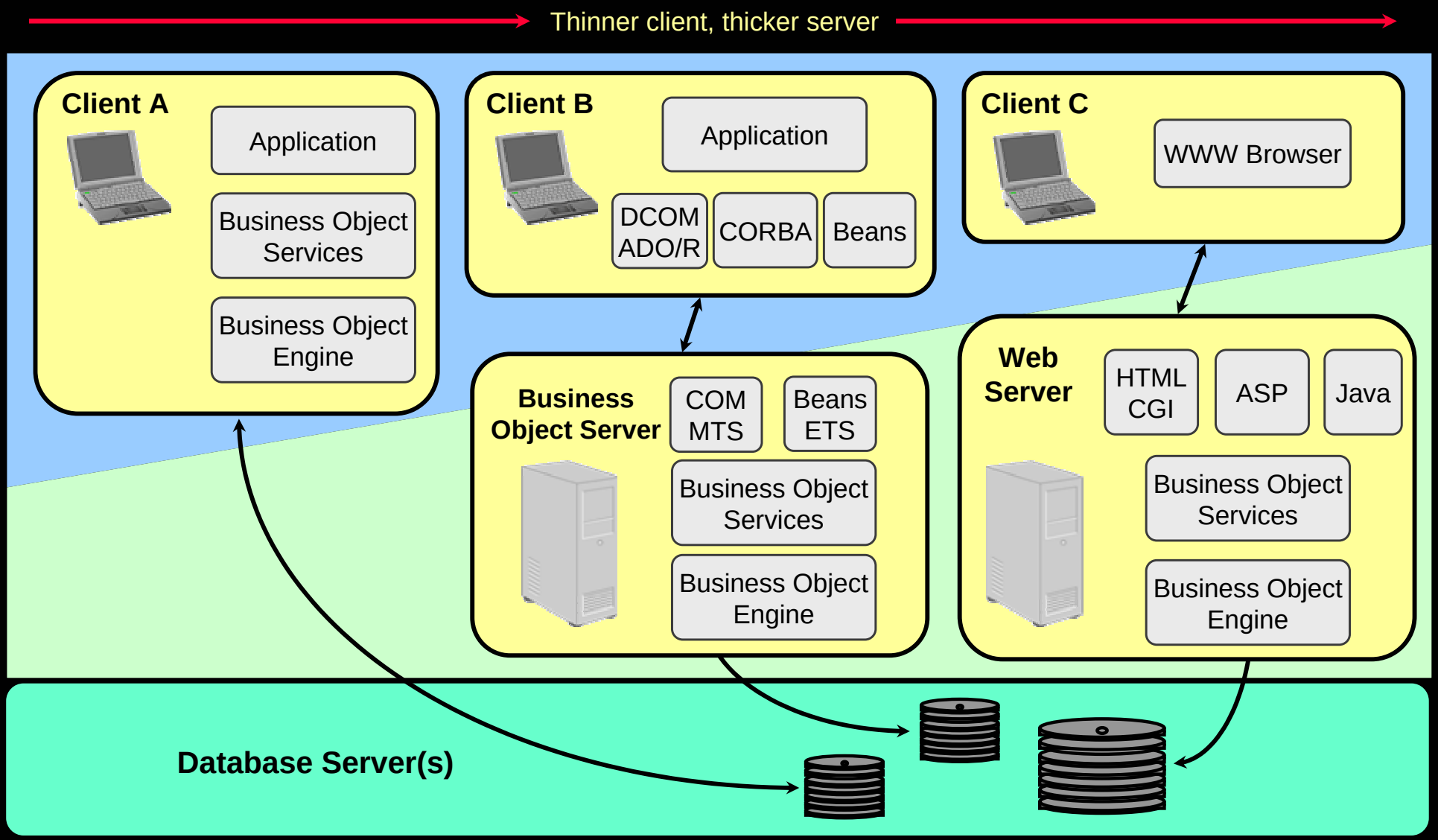
Why Distribute?

- Reduce processor load
- Special processing requirements
- Scaling concerns
- Economic concerns
- Distributed access to the system

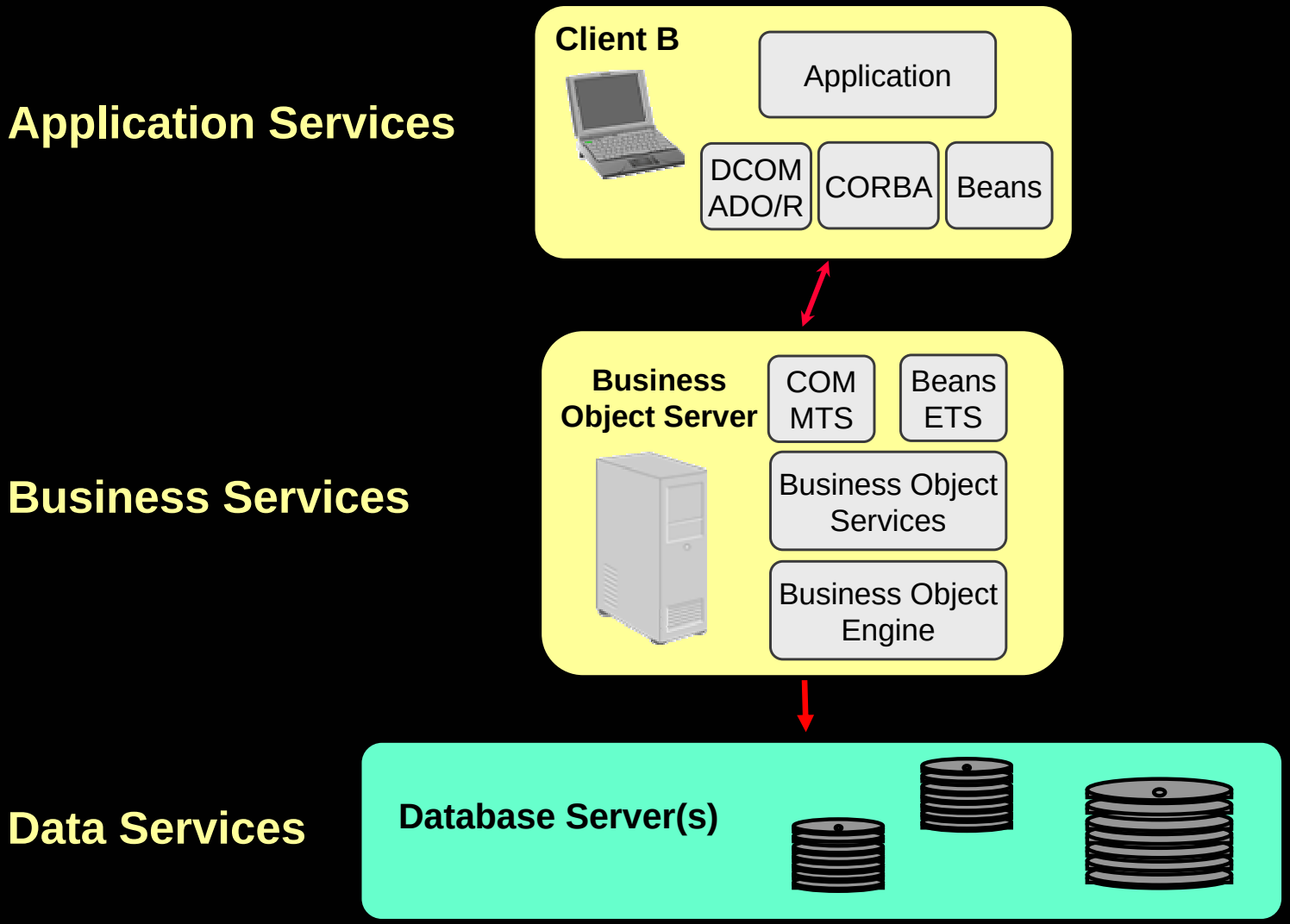
Distribution Patterns

- Client/Server
  - 3-tier
  - Fat Client
  - Fat Server
  - Distributed Client/Server
- Peer-to-peer

Client/Server Architectures



Client/Server: Three-Tier Architecture

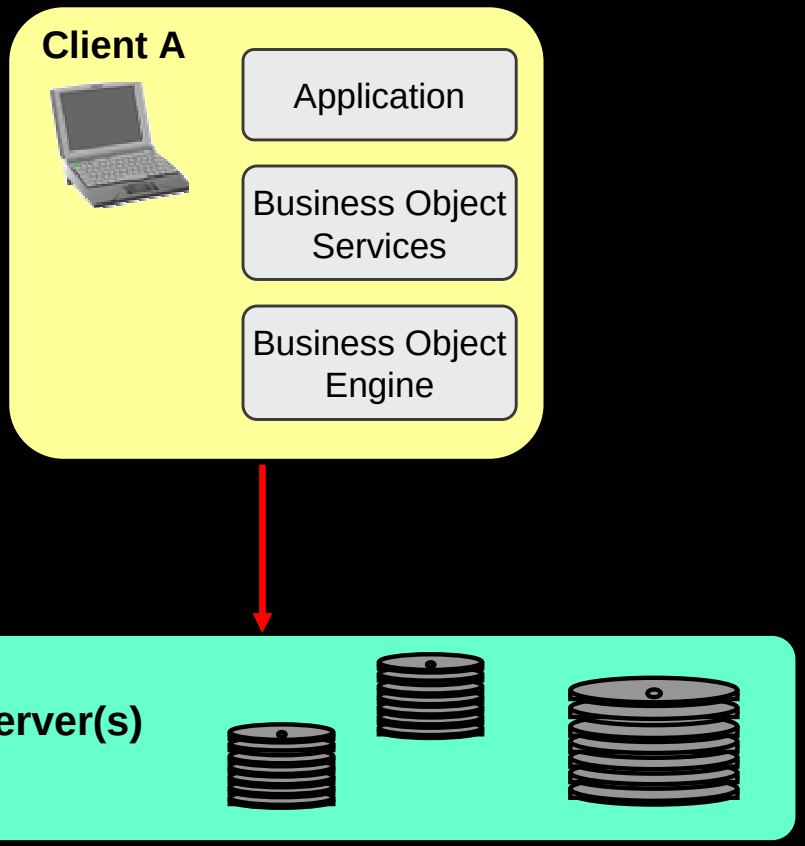


Client/Server: “Fat Client” Architecture

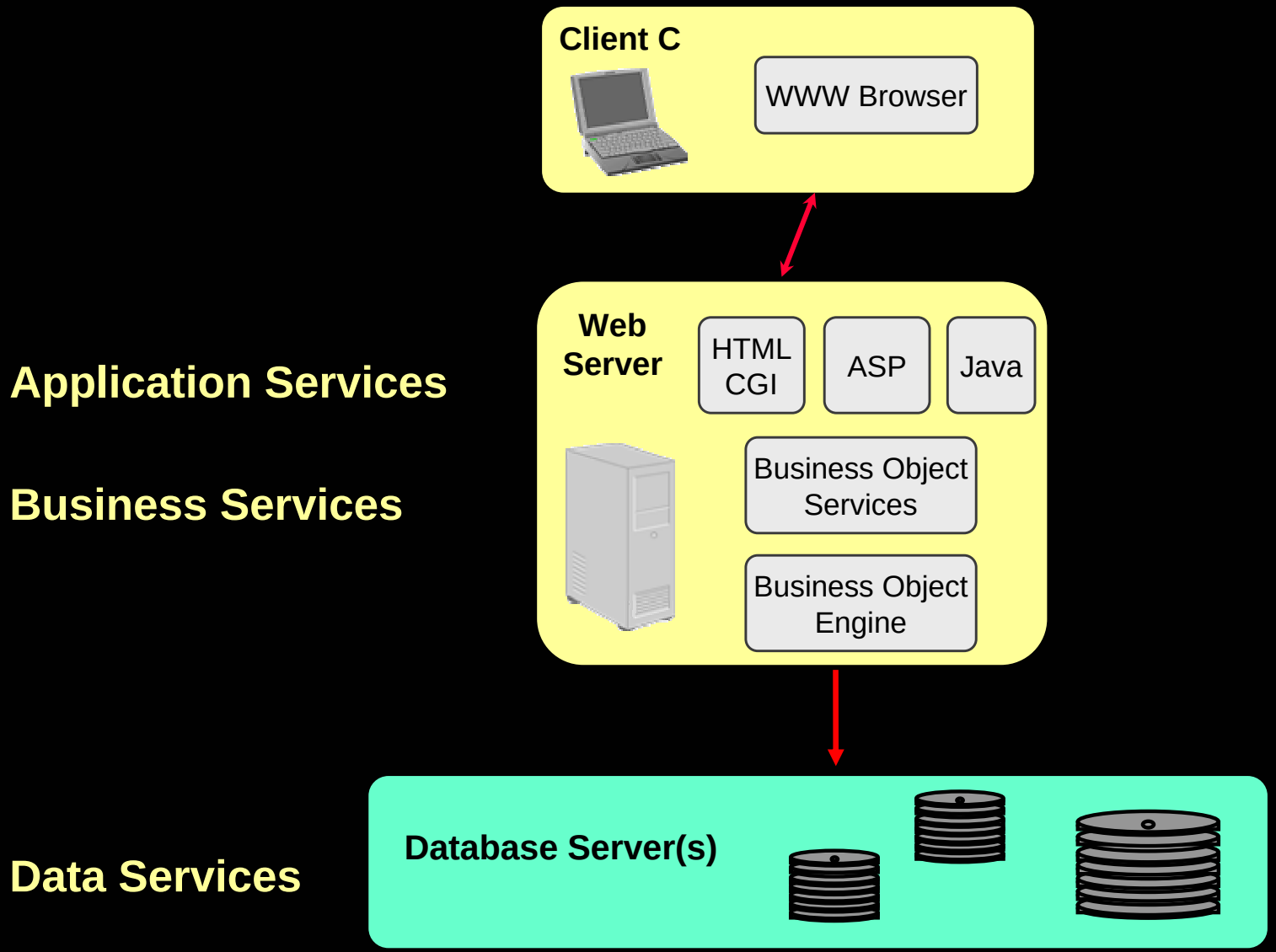
Application Services

Business Services

Data Services



Client/Server: Web Application Architecture

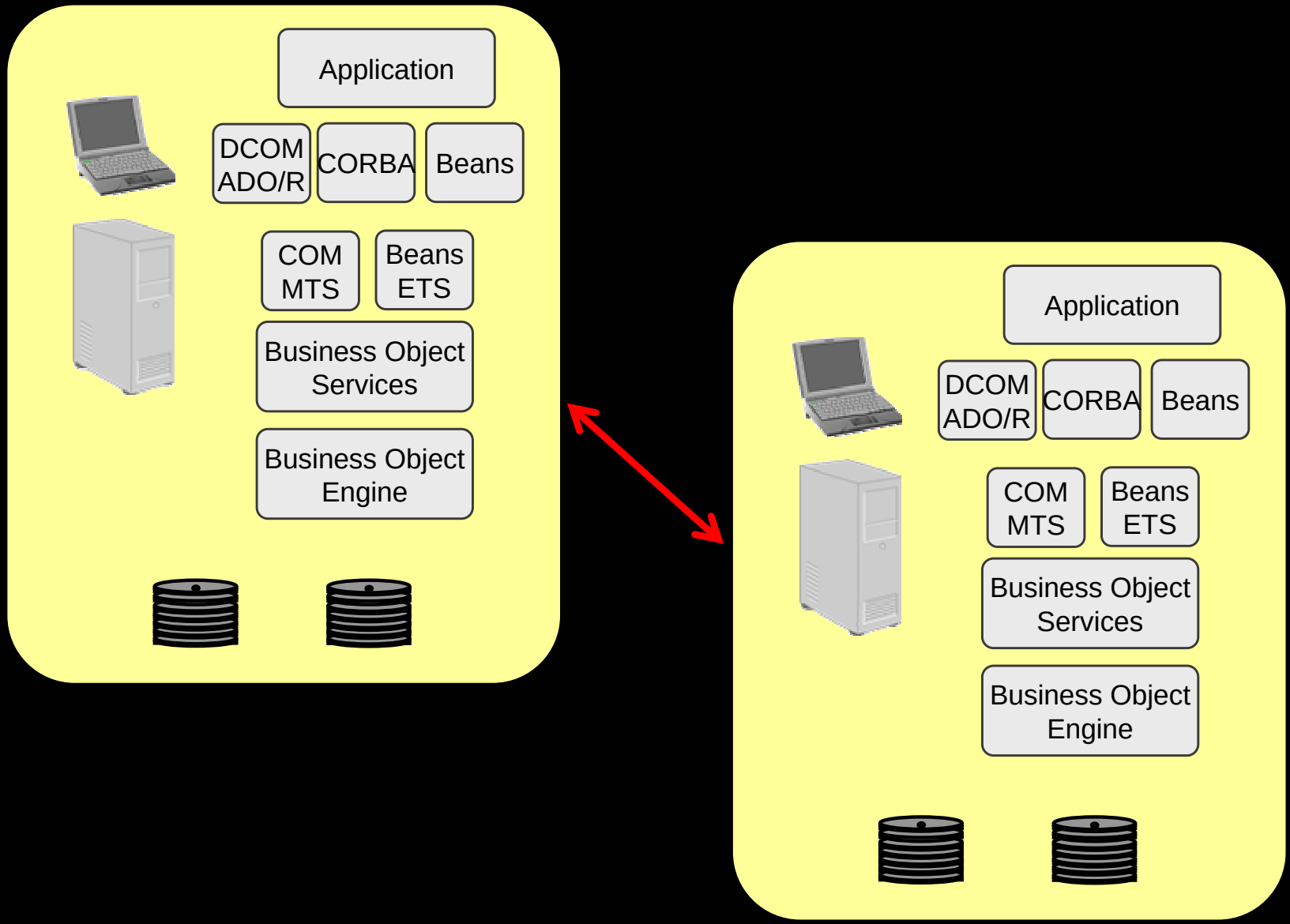


Peer-to-Peer Architecture

Application Services

Business Services

Data Services



Describe Distribution Steps

- Define the network configuration
- Allocate processes to nodes

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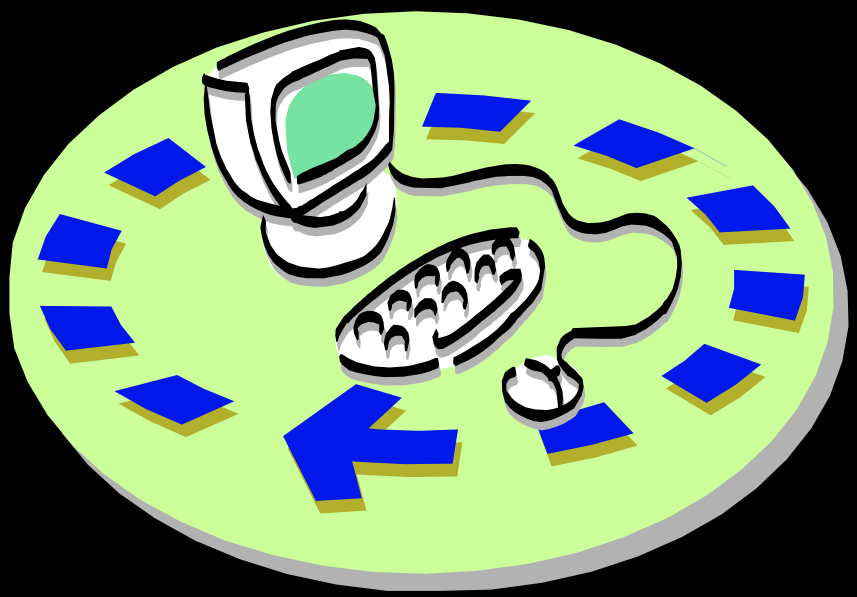
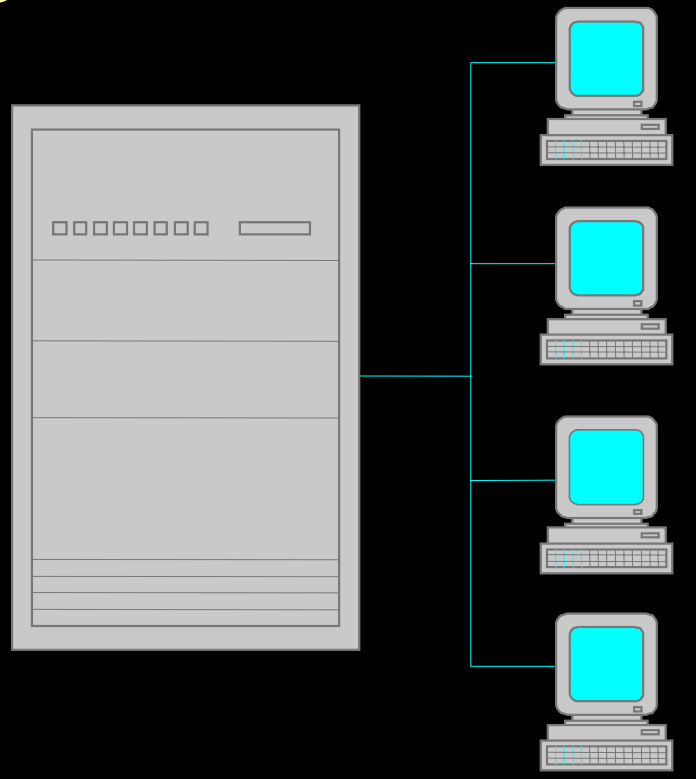


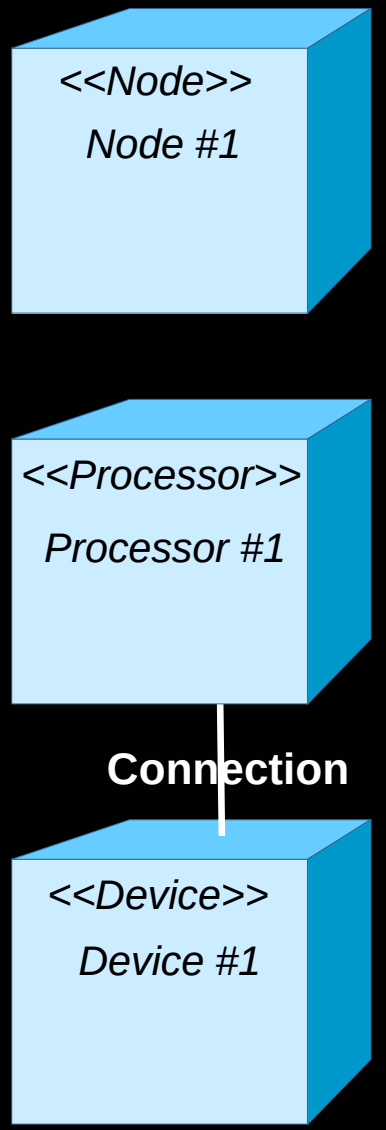
The Network Configuration

- End-user workstation nodes
- ”Headless" processing server nodes
- Special configurations
  - Development
  - Test
- Specialized processors

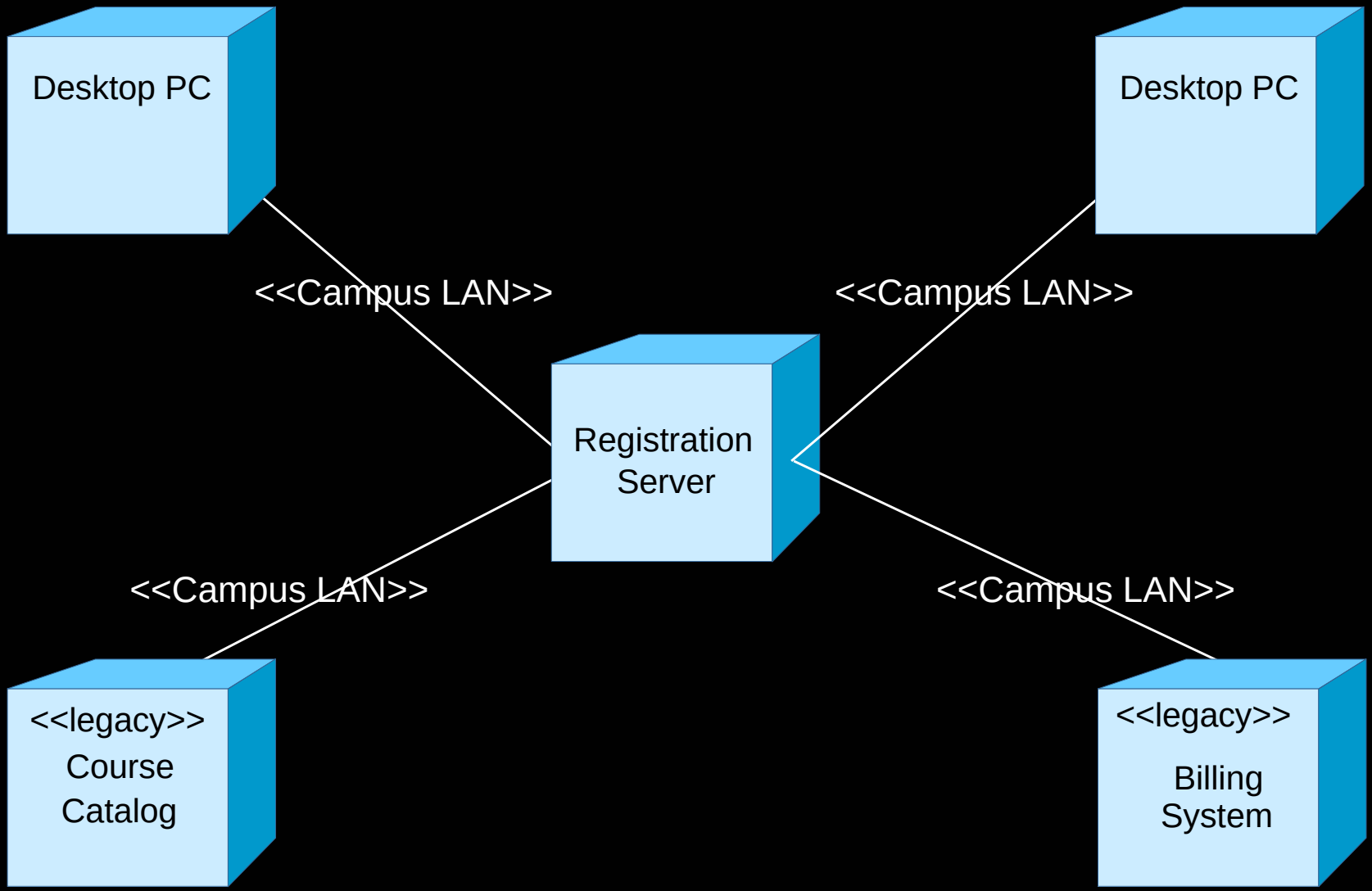


Deployment Model Modeling Elements

- Node
  - Physical run-time computational resource
  - Processor node
    - Executes system software
  - Device node
    - Support device
    - Typically controlled by a processor
- Connection
  - Communication mechanism
  - Physical medium
  - Software protocol



Example: Network Configuration

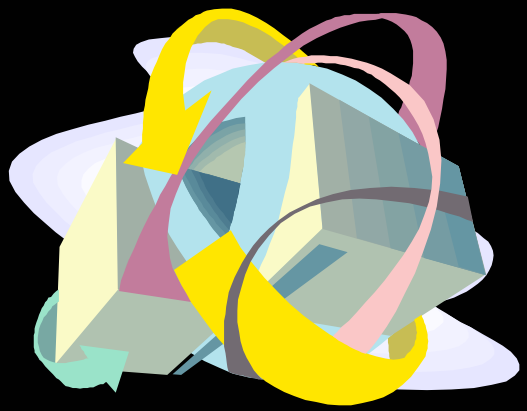


Describe Distribution Steps

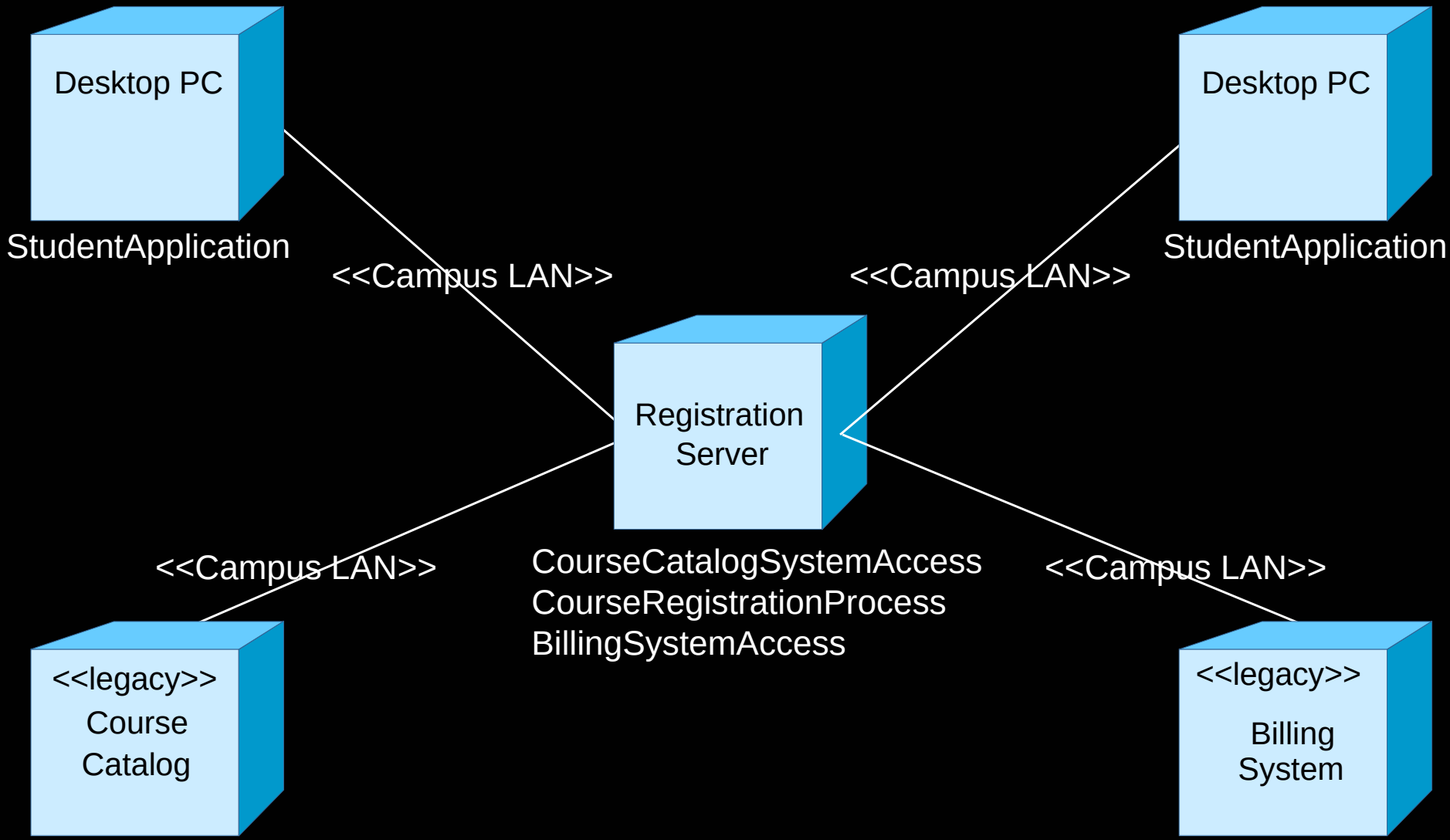
- Define the network configuration
- ★ Allocate processes to nodes

Process-to-Node Allocation Considerations

- Distribution patterns
- Response time and system throughput
- Minimization of cross-network traffic
- Node capacity
- Communication medium bandwidth
- Availability of hardware and communication links
- Rerouting requirements



Example: Process-to-Node Allocation



Checkpoints: Deployment View

- Have the distributed data update coordination and synchronization issues been addressed and documented?
- Are services that require more rapid response available locally (LAN vs. WAN)?
- Have all redundant server issues been addressed and documented (primary vs. secondary)?
- Are the failure modes documented?

Review: Describe Distribution

- What is the purpose of the Describe Distribution activity?
- What is a node? Describe the two different “types” of nodes.
- Describe some of the considerations when mapping processes to nodes.
- How do you model the Deployment View? What modeling elements and diagrams are used?

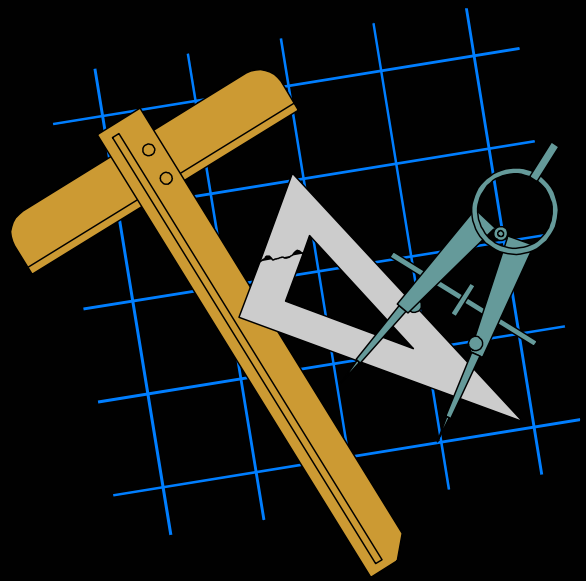
Exercise: Describe Distribution

- Given the following textual information:
  - Network configuration (e.g., nodes and their connections)
    - What processes run on what nodes?

(continued)

Exercise: Use-Case Analysis

- Produce the following:
  - Deployment diagram depicting:
    - Nodes
    - Connections
    - What processes run on what nodes



Exercise: Review

- Compare your Deployment Model with those developed by the rest of the class.
  - Have nodes and node connections been modeled?
  - Have processes been identified and assigned to nodes? Do the allocations make sense?
  - Are the processes listed beneath the nodes in the Deployment diagram?

Payroll System