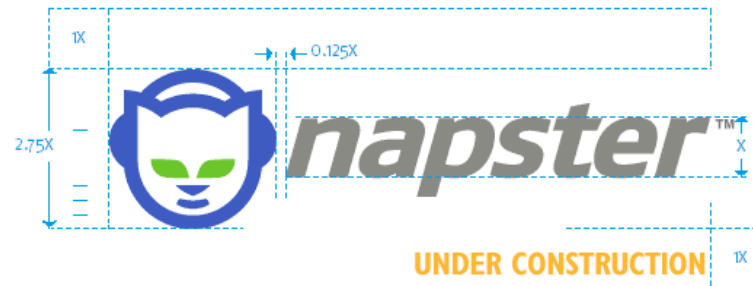


Beyond Napster: An Overview of Peer-to-Peer Systems and Applications

Sami Rollins

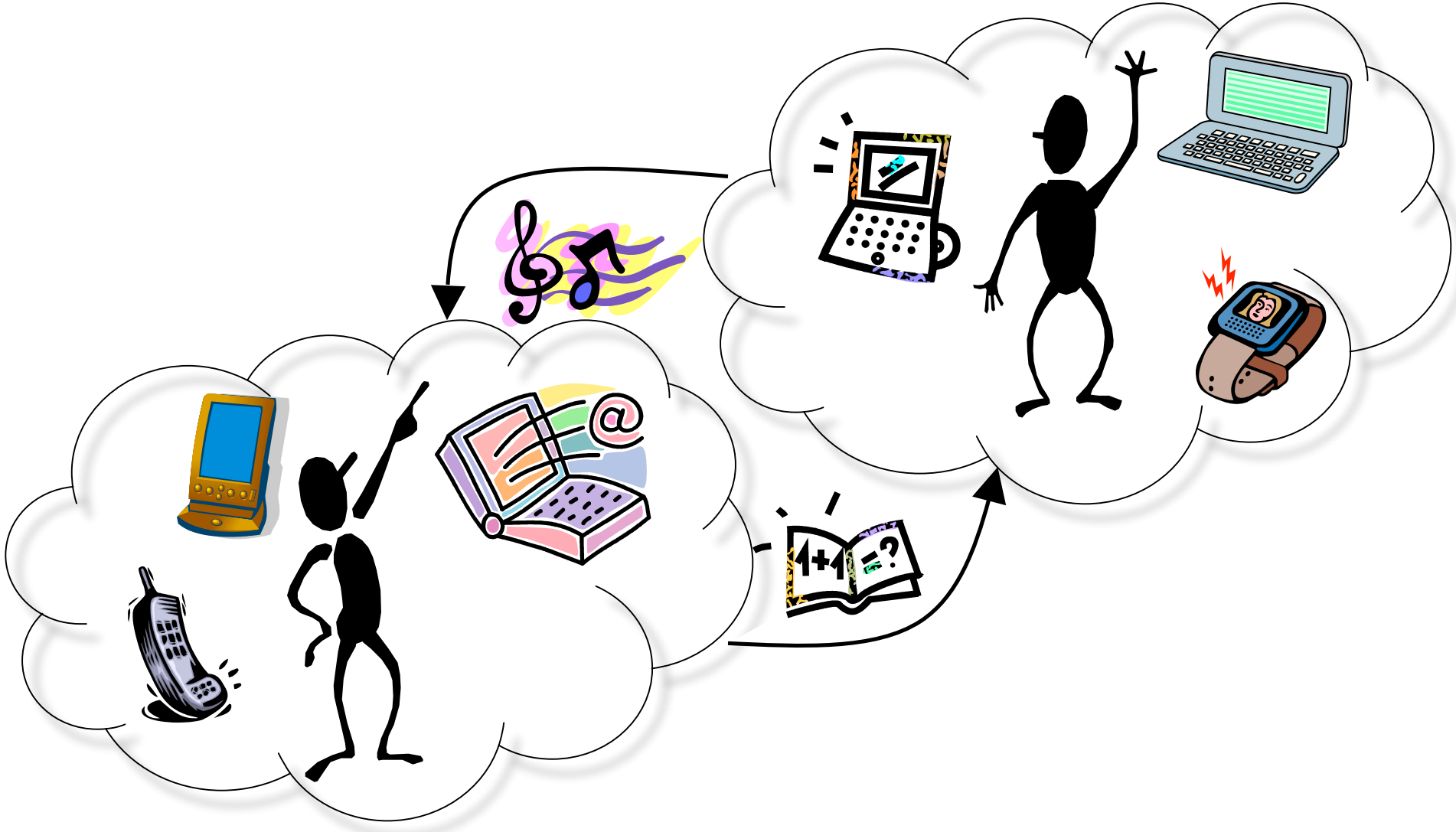
What is Peer-to-Peer (P2P)?



Introduction

- Motivation: a vision of the future
- A taxonomy of P2P systems
- Three common implementations
- Mobile P2P

Motivation

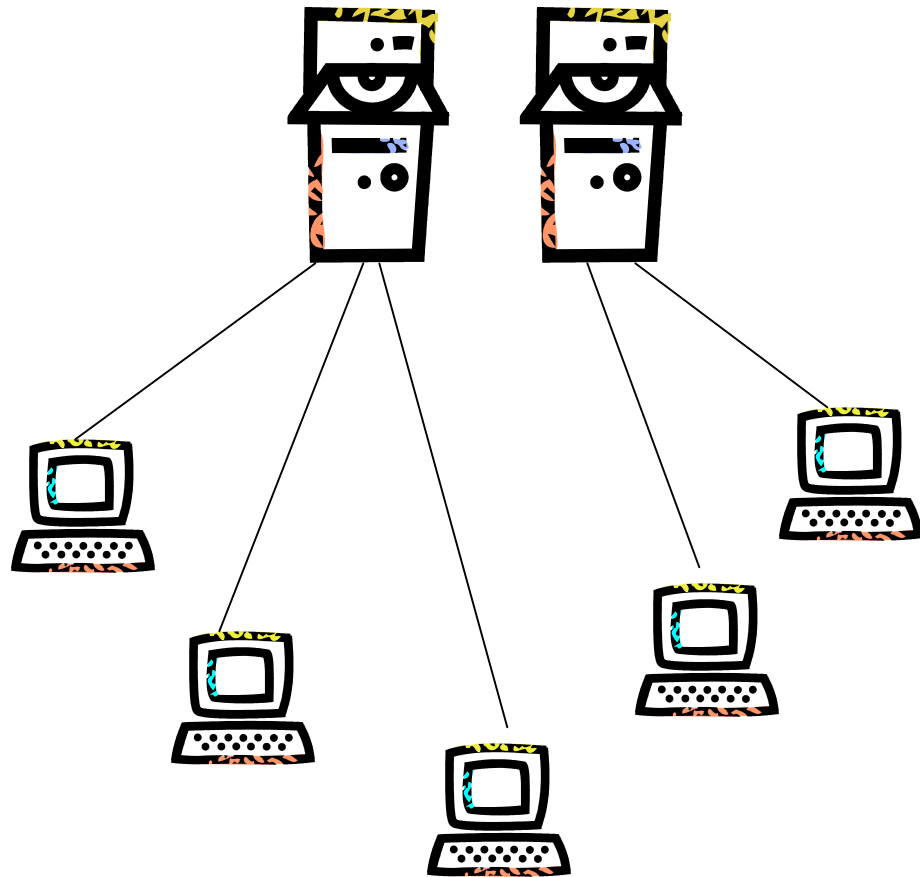


What is a *peer*?

- “...an entity with capabilities similar to other entities in the system.”

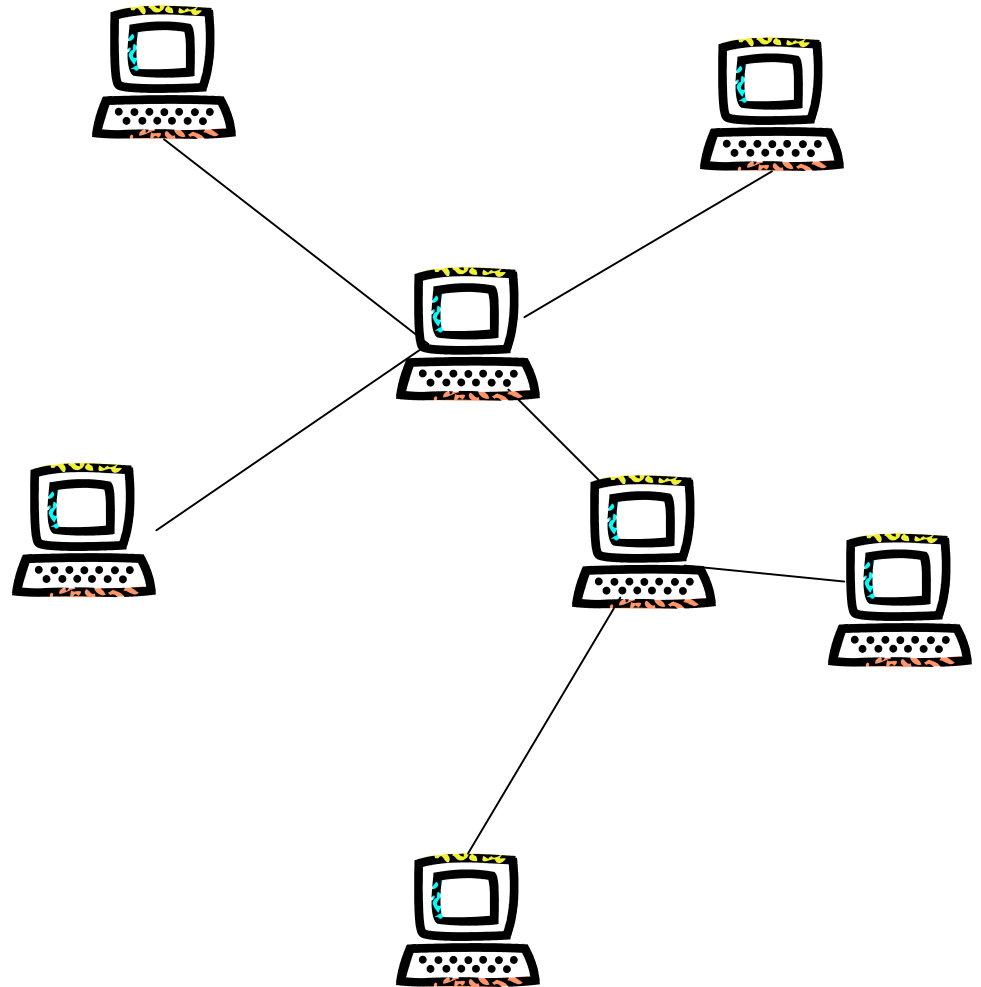
The Web Model

- Contact a server and download a web page
- Server has all the resources and capabilities
- But...client devices becoming more powerful and well-connected

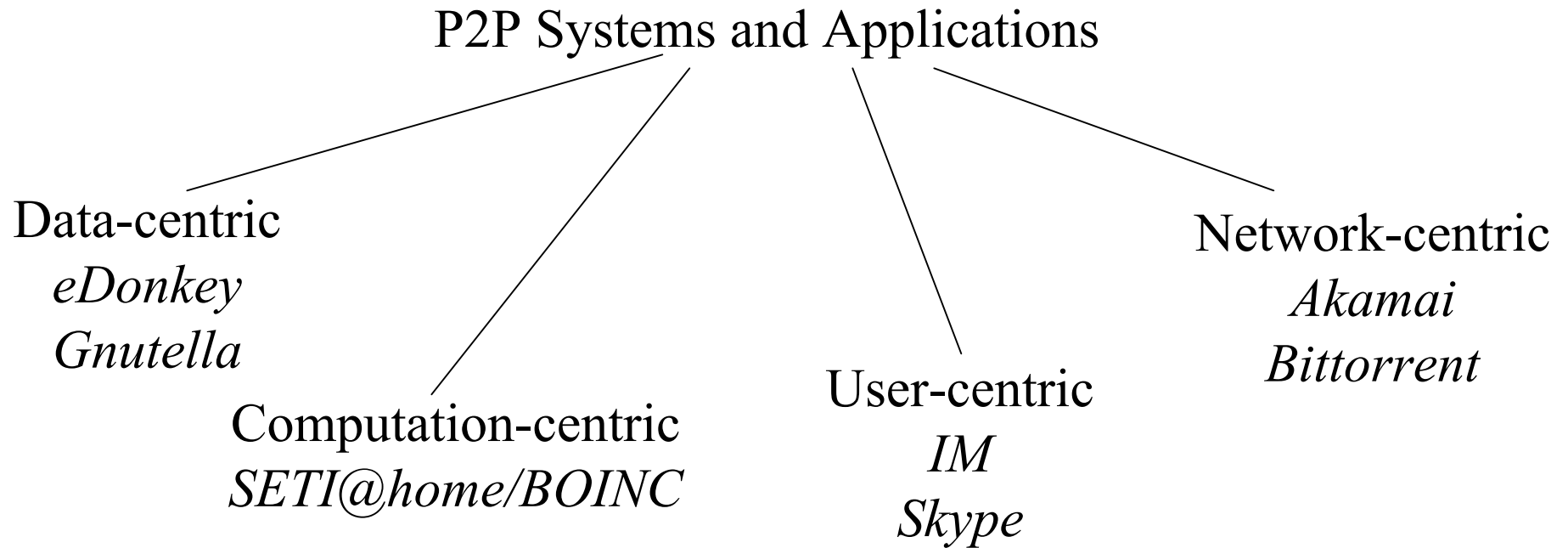


The P2P Model

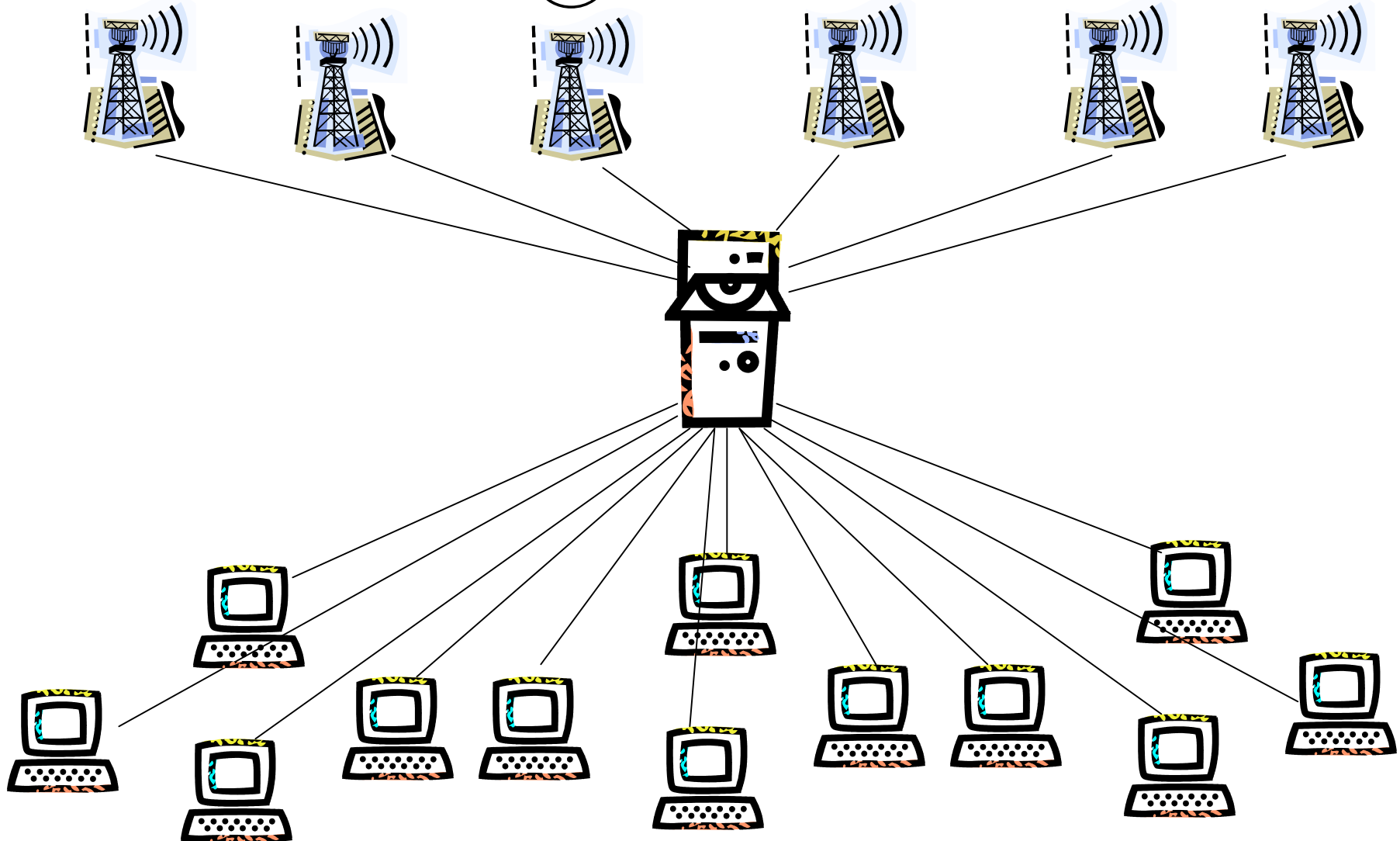
- A peer's resources are similar to the resources of the other participants
- P2P – peers communicating directly with other peers and sharing resources



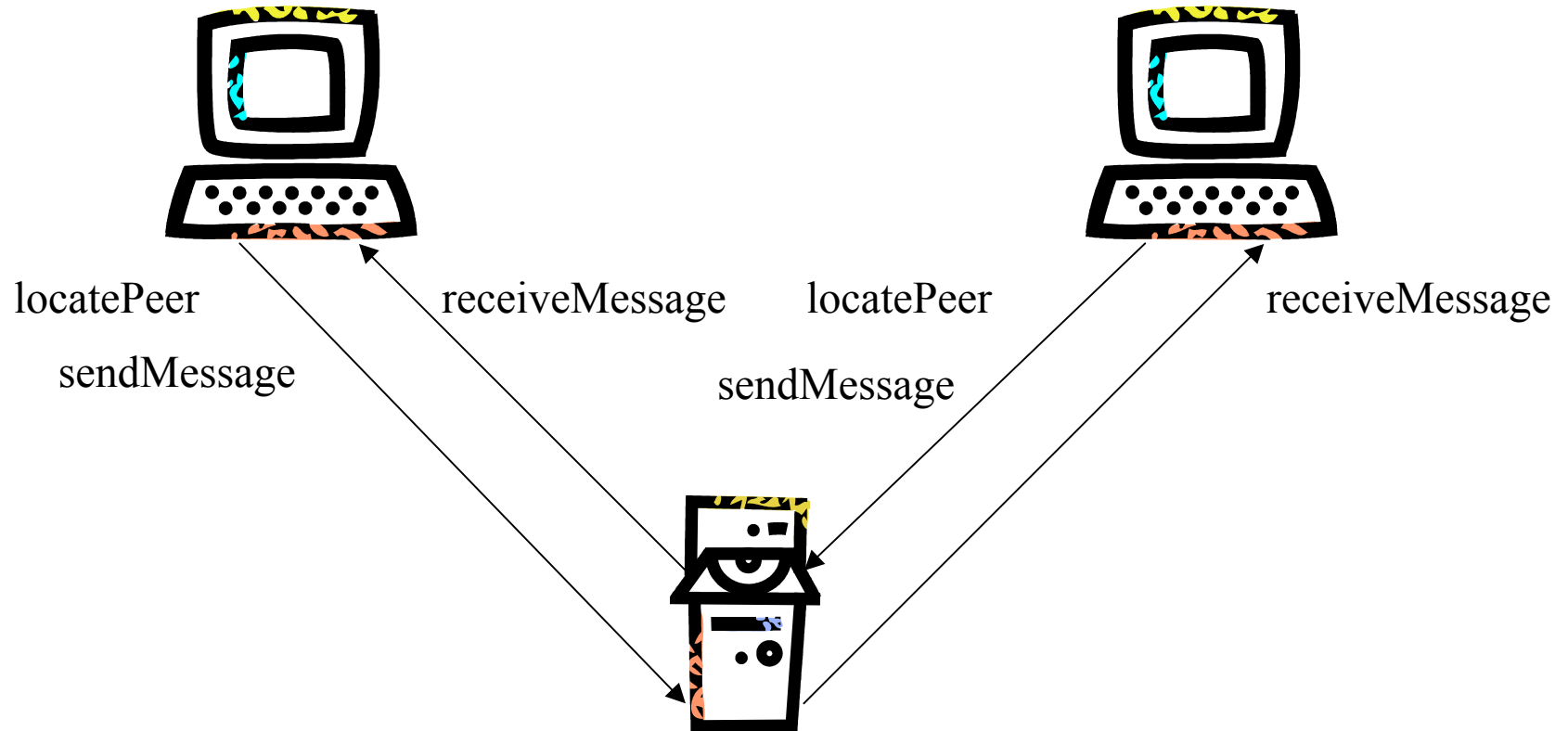
P2P System Taxonomy



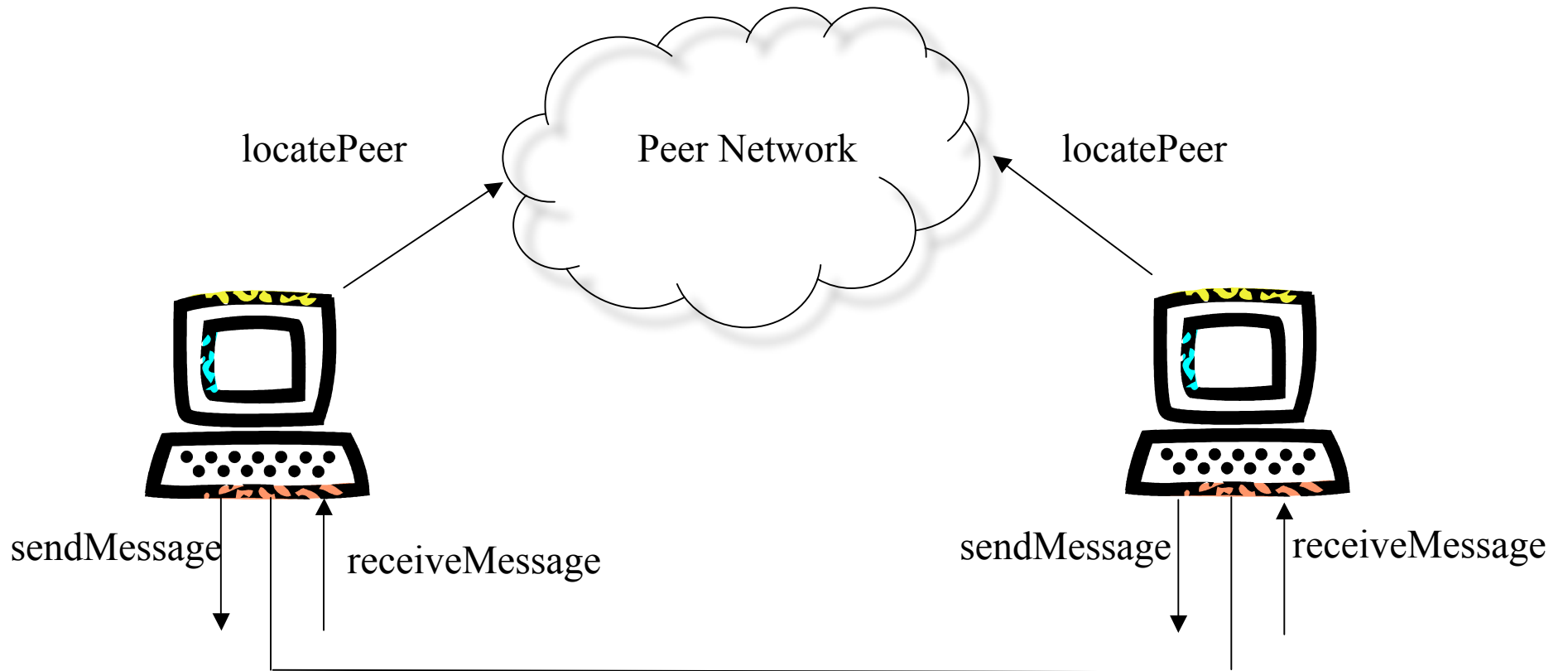
Computation-centric *SETI@home/BOINC*



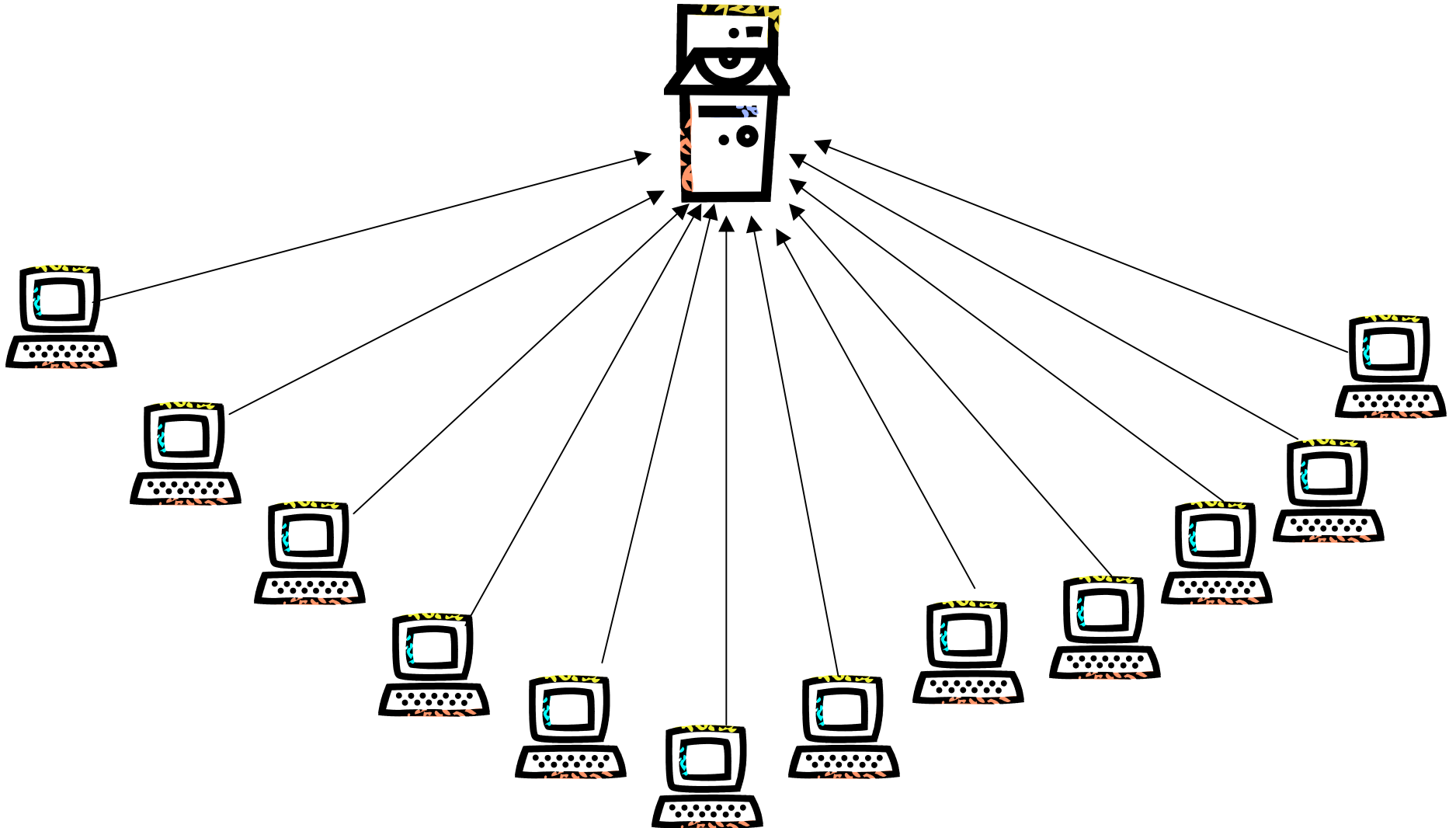
User-centric *Instant Messaging*



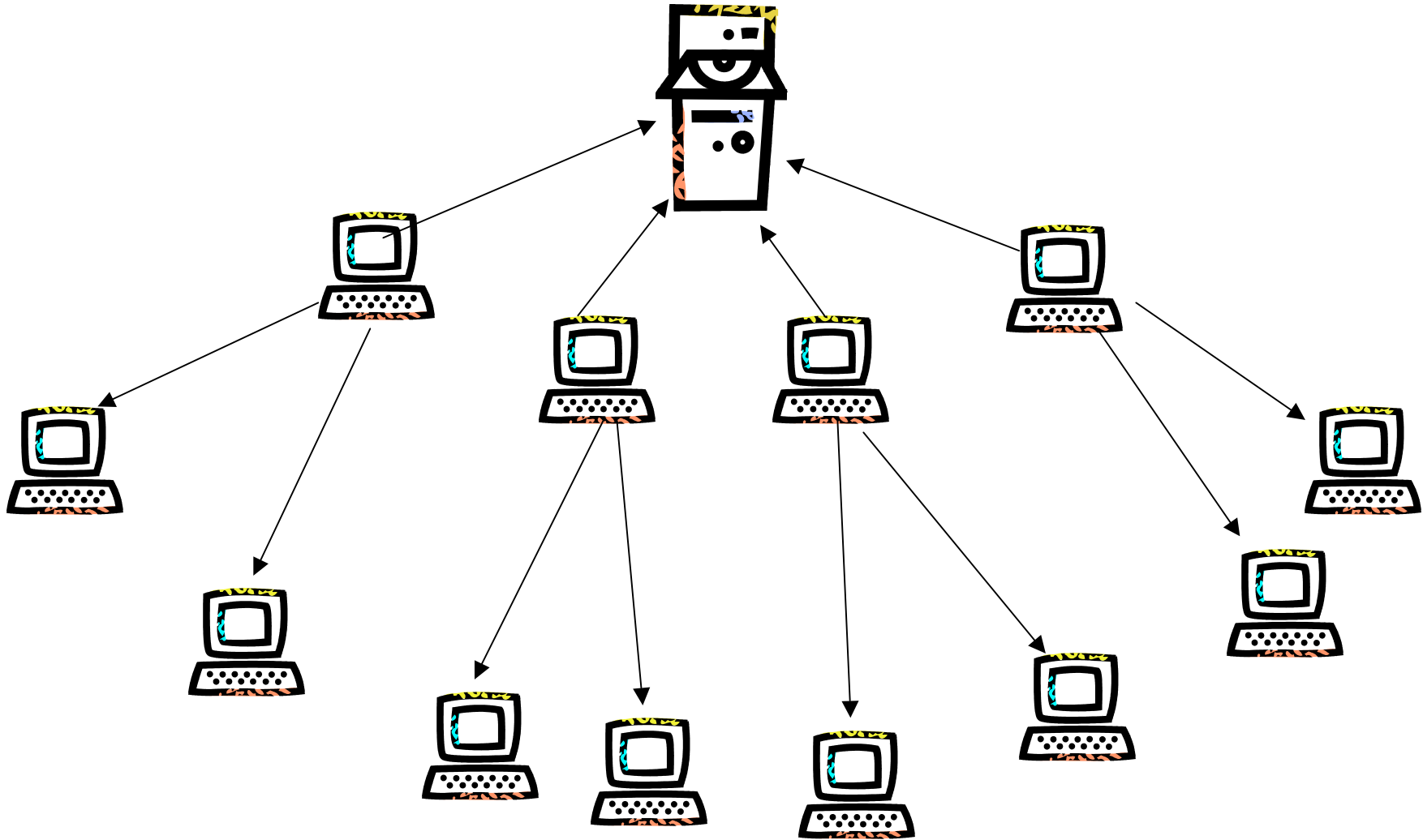
User-centric *Instant Messaging*



Network-centric *Content Distribution*



Network-centric *Content Distribution*



P2P Goals/Benefits

- Cost sharing
- Resource aggregation
- Improved scalability/reliability
- Increased autonomy
- Anonymity/privacy
- Dynamism

Research Questions

- Group Management

- *How do I find and connect to my peers?*



- Data/Resource Location

- *How do I find the resources (e.g., files) I want?*

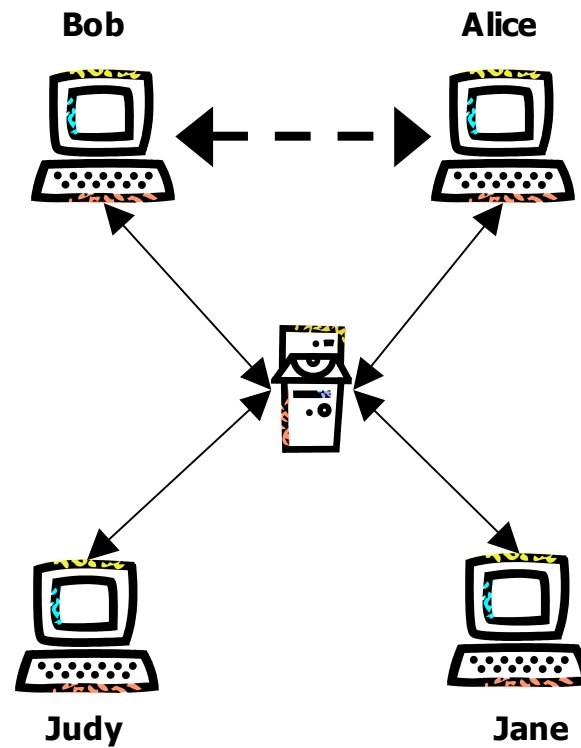


Approaches

- Centralized
- Unstructured
- Structured (Distributed Hash Tables)

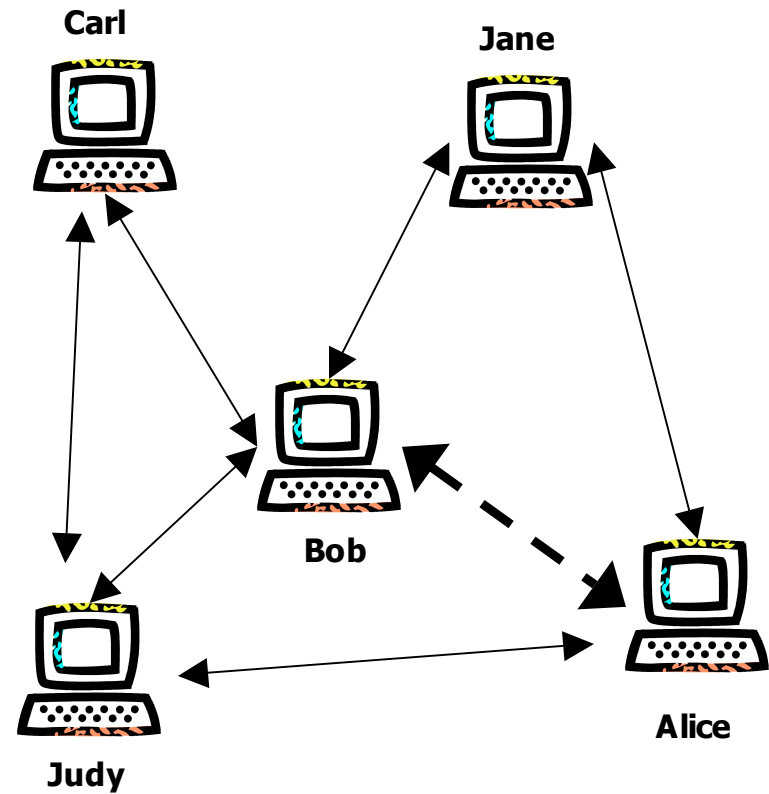
Centralized

- Napster model
- Benefits:
- Drawbacks:



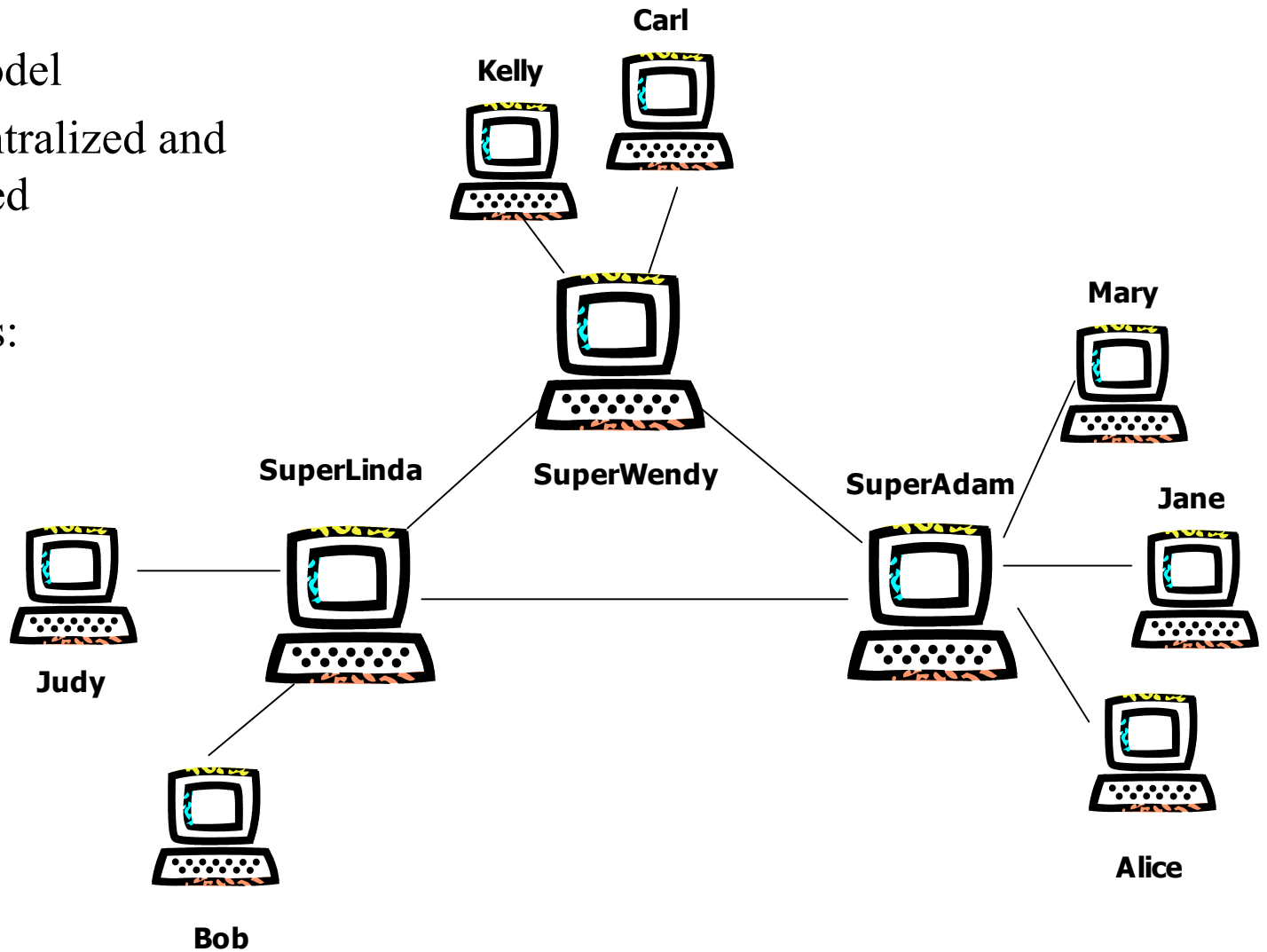
Unstructured

- Gnutella model
- Benefits:
- Drawbacks:



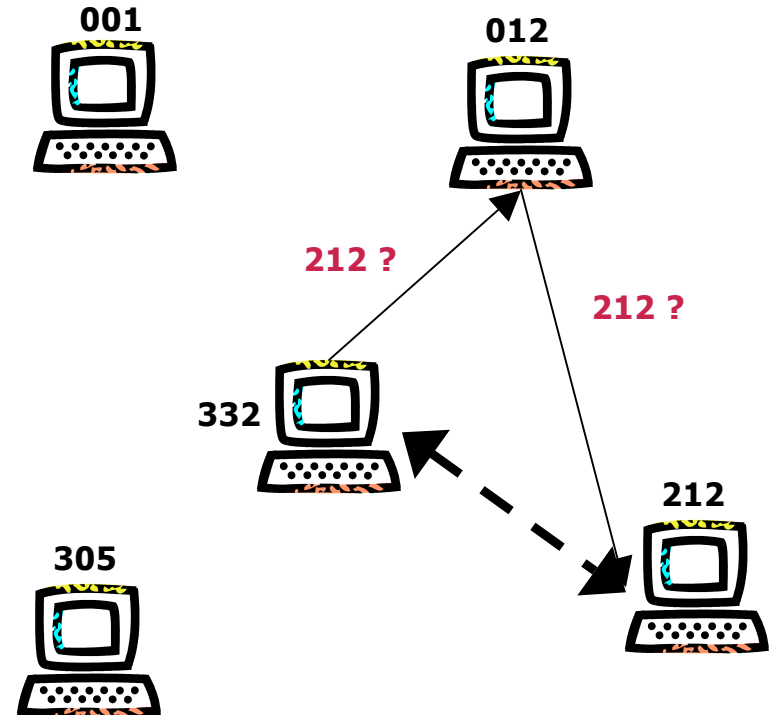
Improvements: SuperPeers

- KaZaA model
- Hybrid centralized and unstructured
- Benefits:
- Drawbacks:



Structured

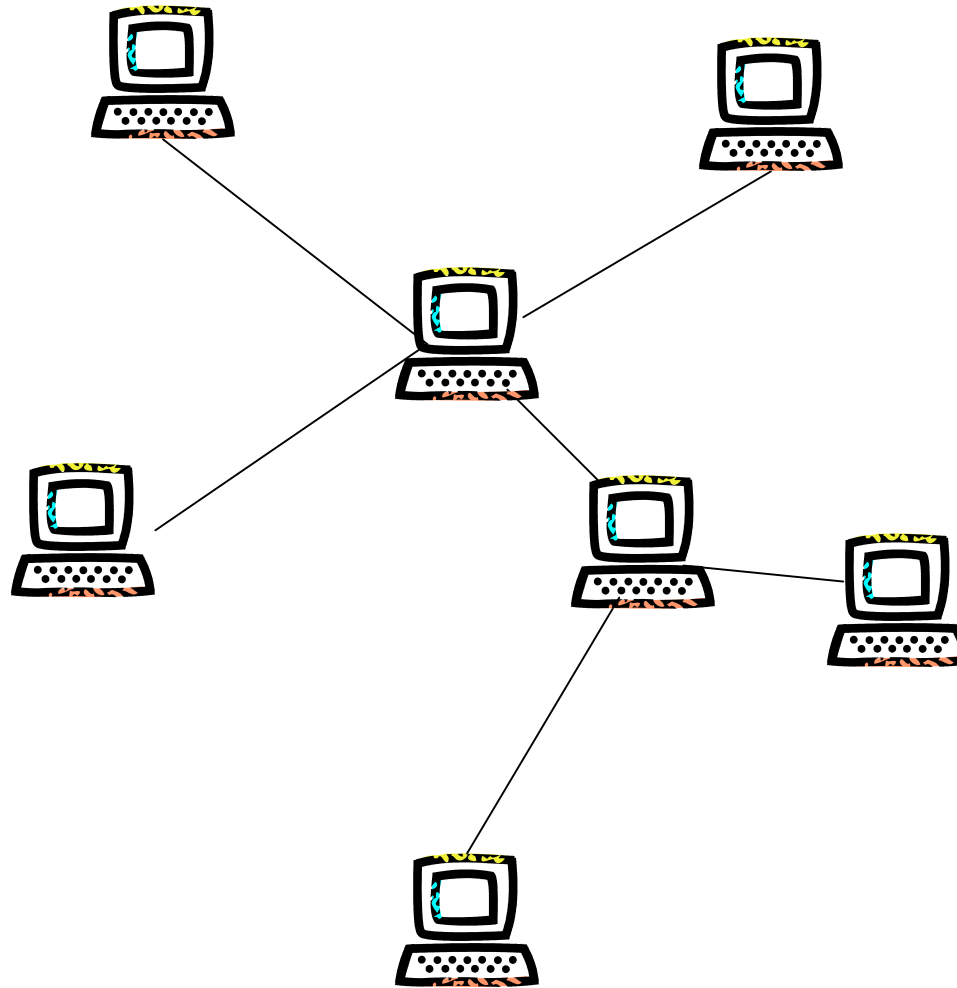
- Chord, CAN, Tapestry, Pastry model
- Benefits:
- Drawbacks:



P2P Challenges

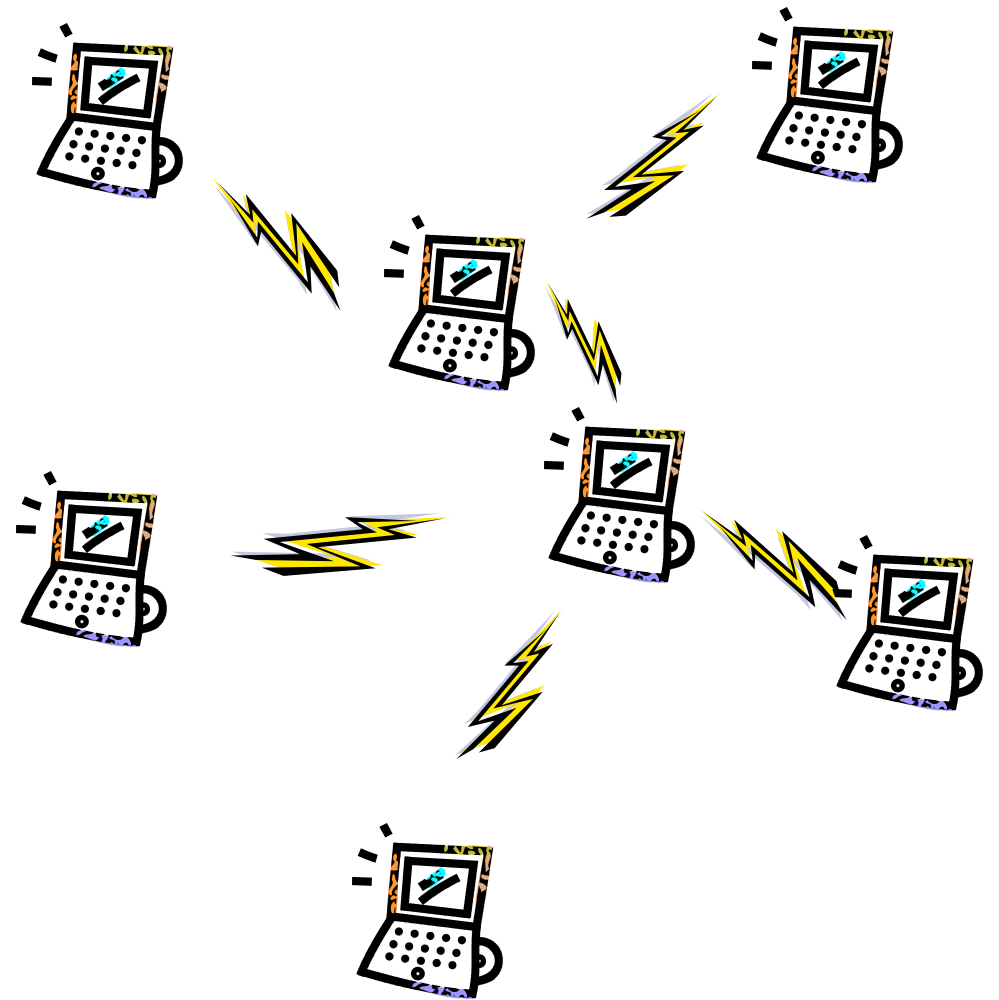
- Decentralization
- Scalability and Performance
- Anonymity
- Fairness
- Dynamism
- Security

From P2P to Mobile Computing



Mobile Computing

- Devices frequently disconnected from each other and the Internet
- Devices have a limited supply of energy!



Current Research

- **Hierarchical Power Management**
 - Mark Corner, Jacob Sorber, Nilanjan Banerjee (UMass Amherst)
 - Goal: Combine mobile platforms with varying power consumption characteristics into a single power-efficient device
- **LLAMA - Longer Lifetime Algorithms for Mobile Applications**
 - Denitsa Tilkidjieva, Maria Kazandjieva, Mark Corner, Nilanjan Banerjee
 - Goal: Employ intelligent algorithms for determining how much energy a mobile device can devote to performing background tasks

Summary

- P2P is more than just file sharing!
- Building P2P systems and applications poses lots of interesting challenges

Beyond Napster: An Overview of Peer-to-Peer Systems and Applications

Sami Rollins

Improvements: SuperPeers

- KaZaA model
- Hybrid centralized and unstructured
- Advantages and disadvantages?

