



Computer Networks

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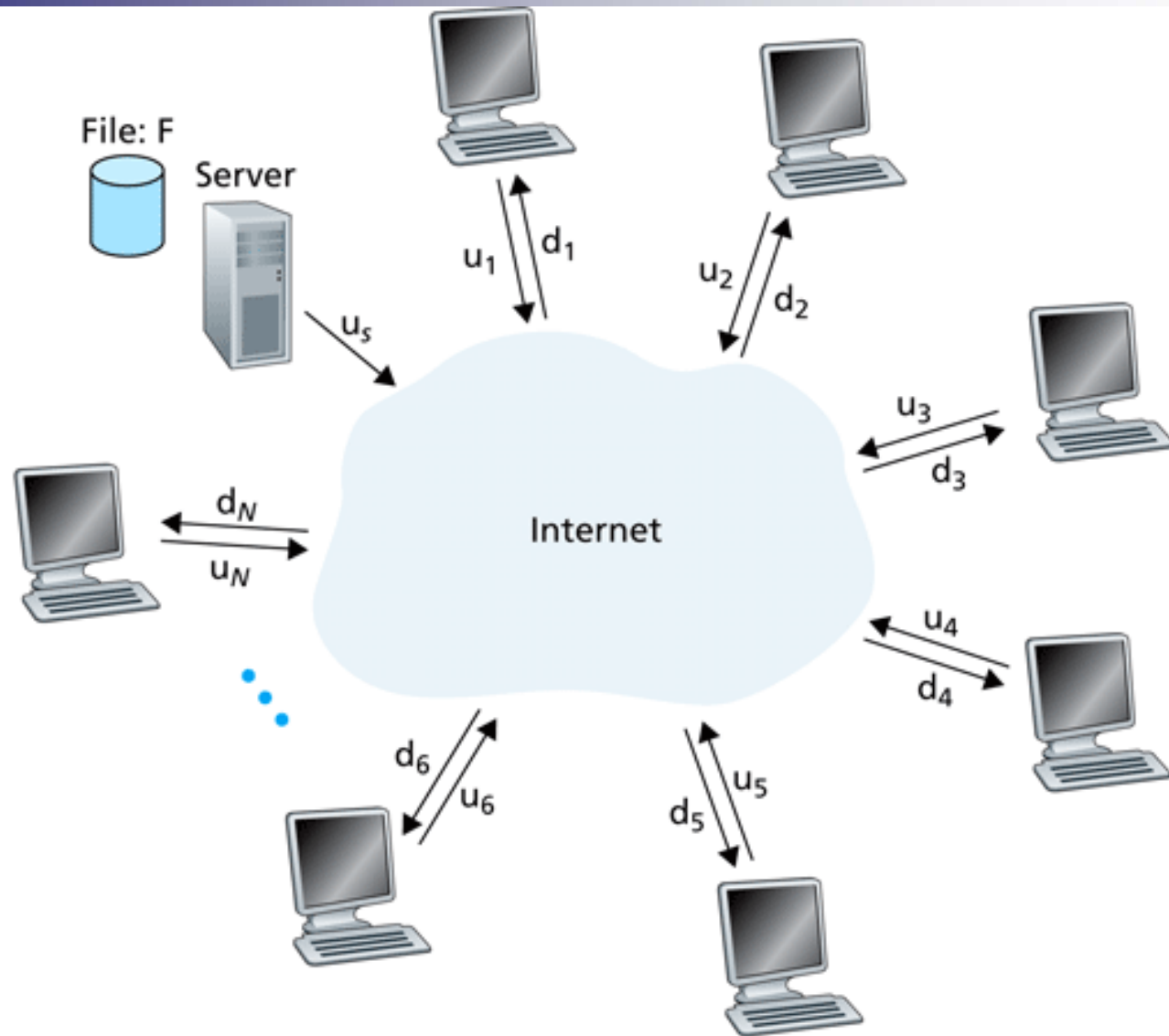


Figure 2.24 ♦ An illustrative file distribution problem

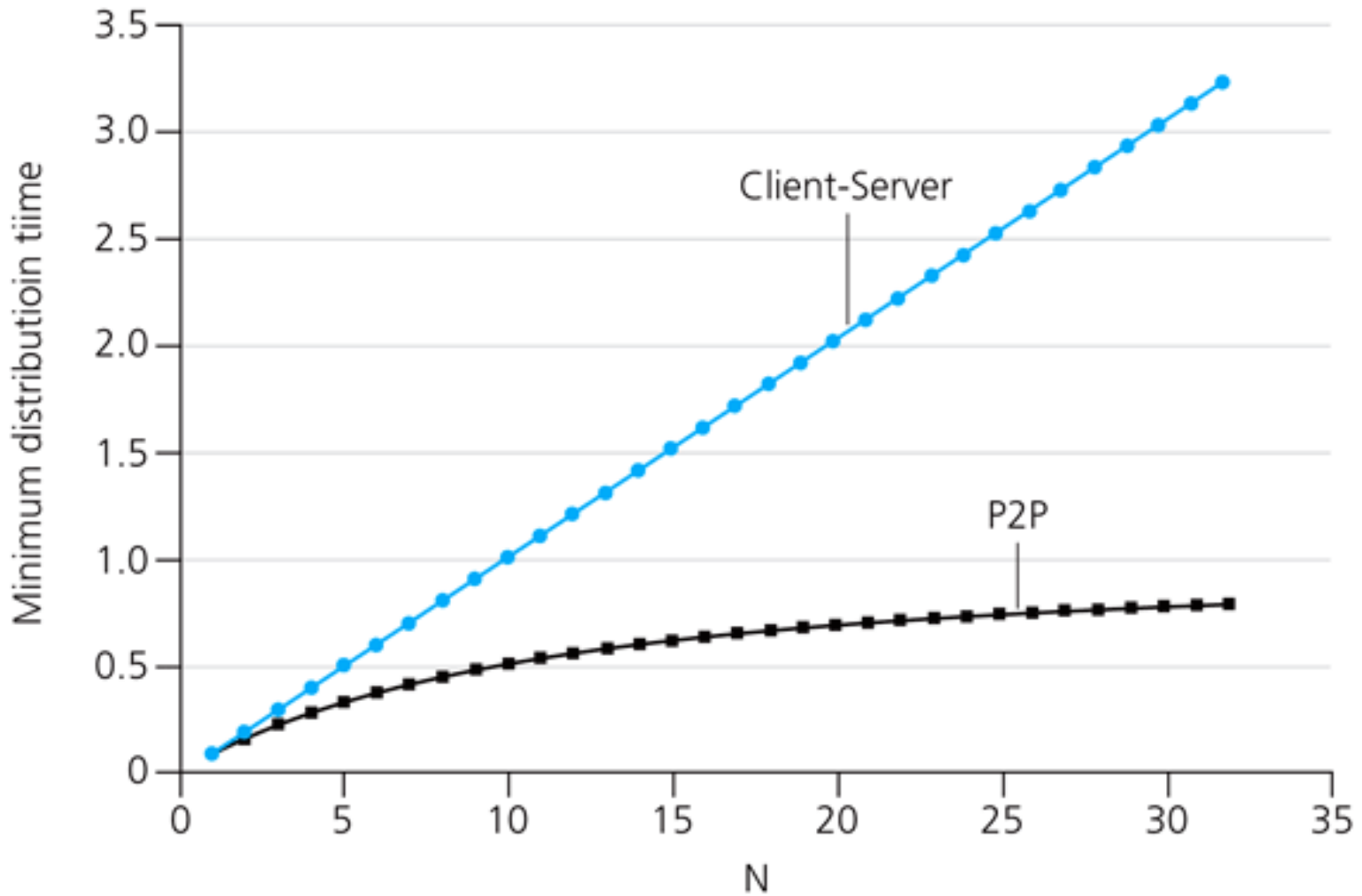


Figure 2.25 ♦ Distribution time for P2P and client-server architectures



Properties of P2P System

- High degree of decentralization
- Self-organization
- Multiple administrative domains
- Low barrier to deployment
- Organic growth
- Resilience to faults and attacks
- Abundance and diversity of resources

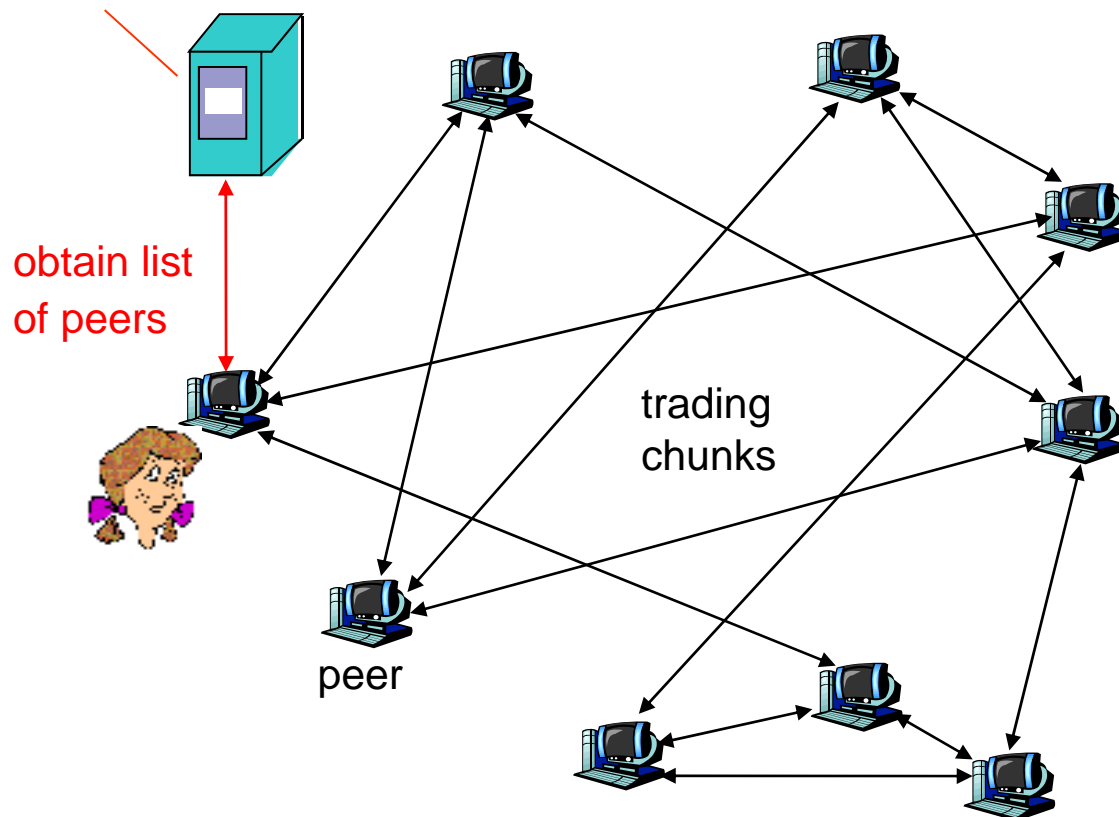
Applications

- Sharing and distributing files
- Streaming media
- Telephony
- Volunteer computing
 - Spare system resources

Bit Torrent

tracker: tracks peers participating in torrent

torrent: group of peers exchanging chunks of a file



BitTorrent

- Spring 2007 → 30% Internet backbone traffic
- Torrent
- Chunks
- Tracker
- Rarest First
- Trading Algorithm



Architectures for Locating Content

- Centralized Directory
- Decentralized Directory
- Query Flooding

Centralized Index

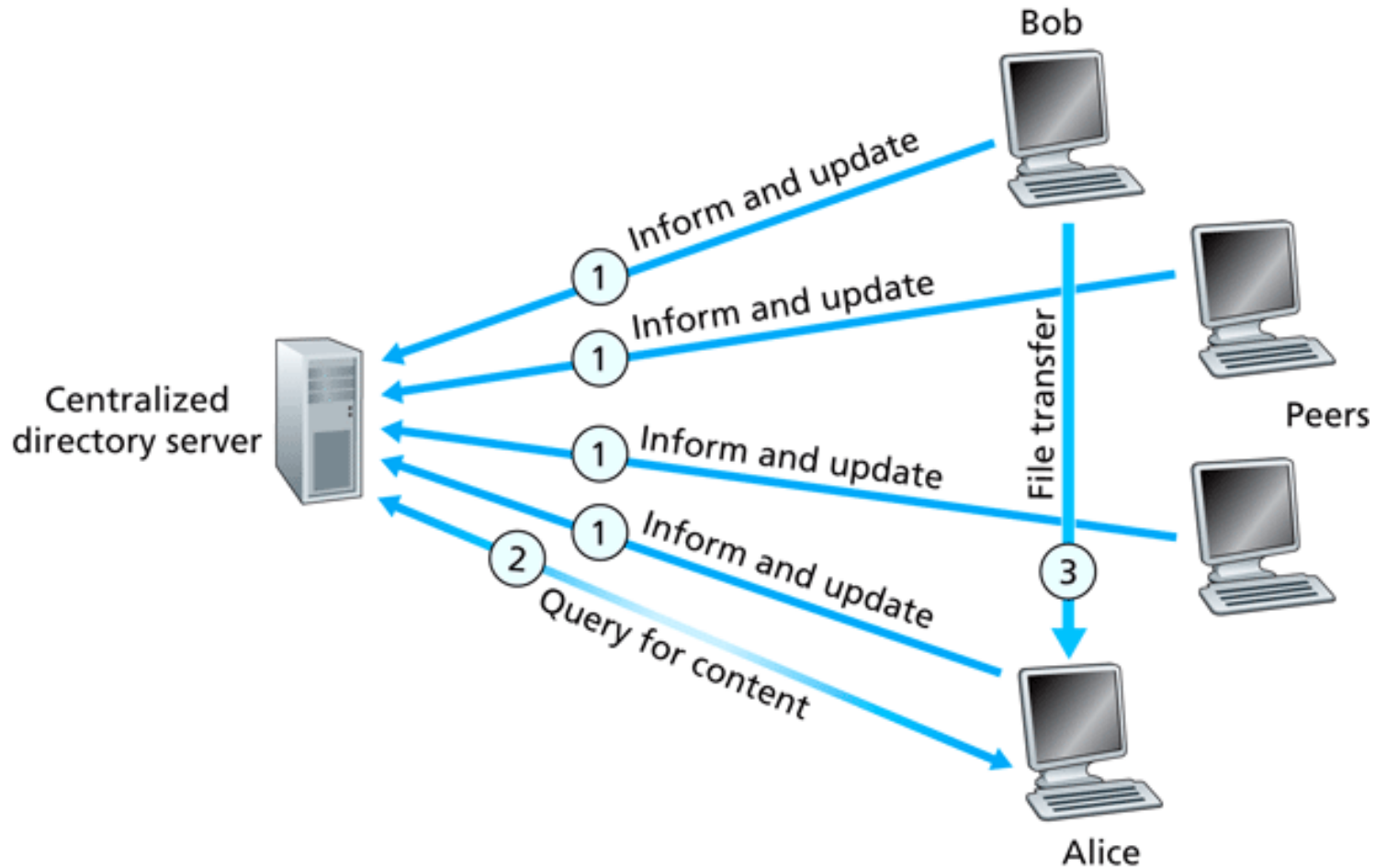


Figure 2.27 ♦ Centralized index

Query Flooding

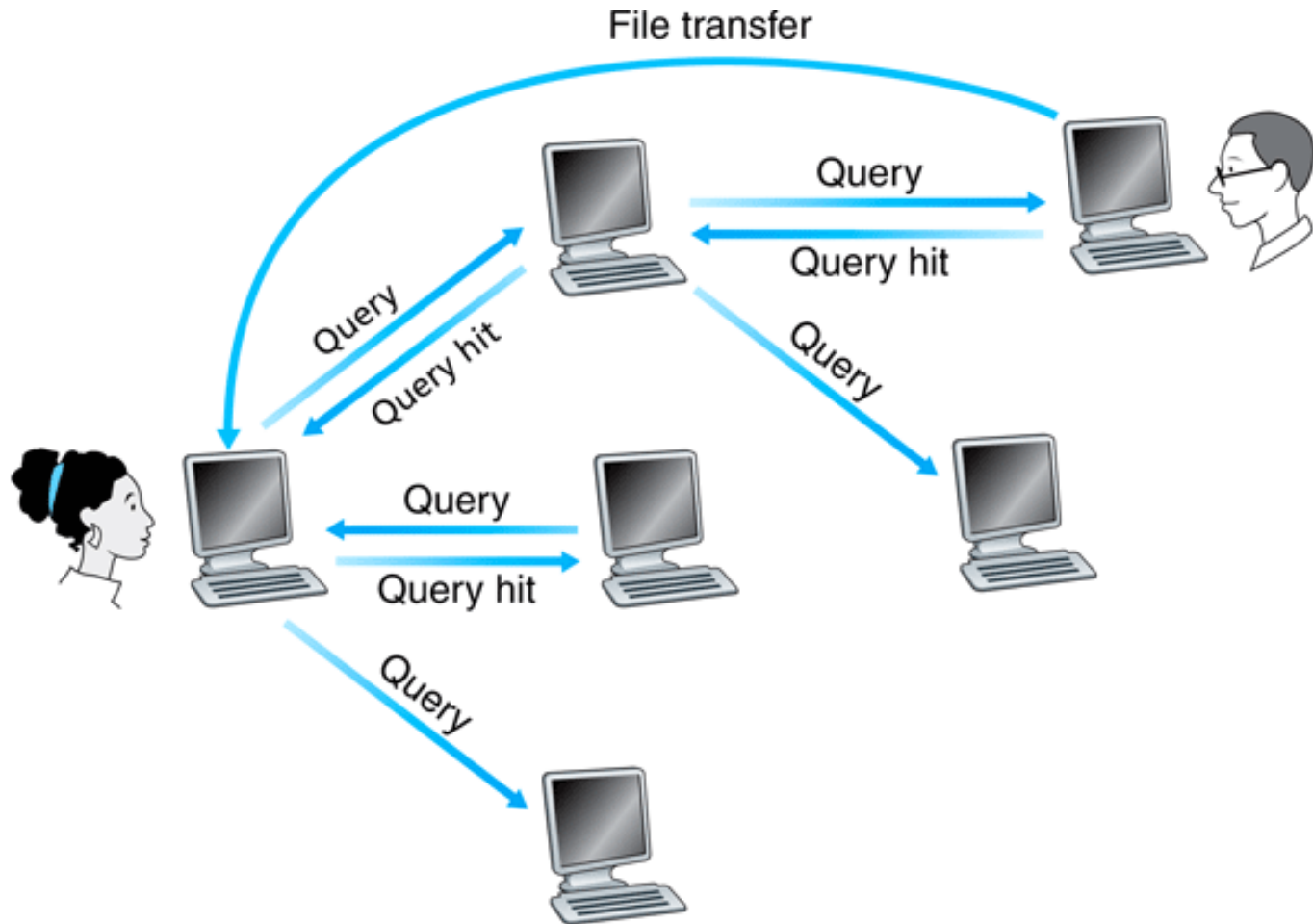


Figure 2.28 ♦ Query flooding

Hierarchical Overlay Design

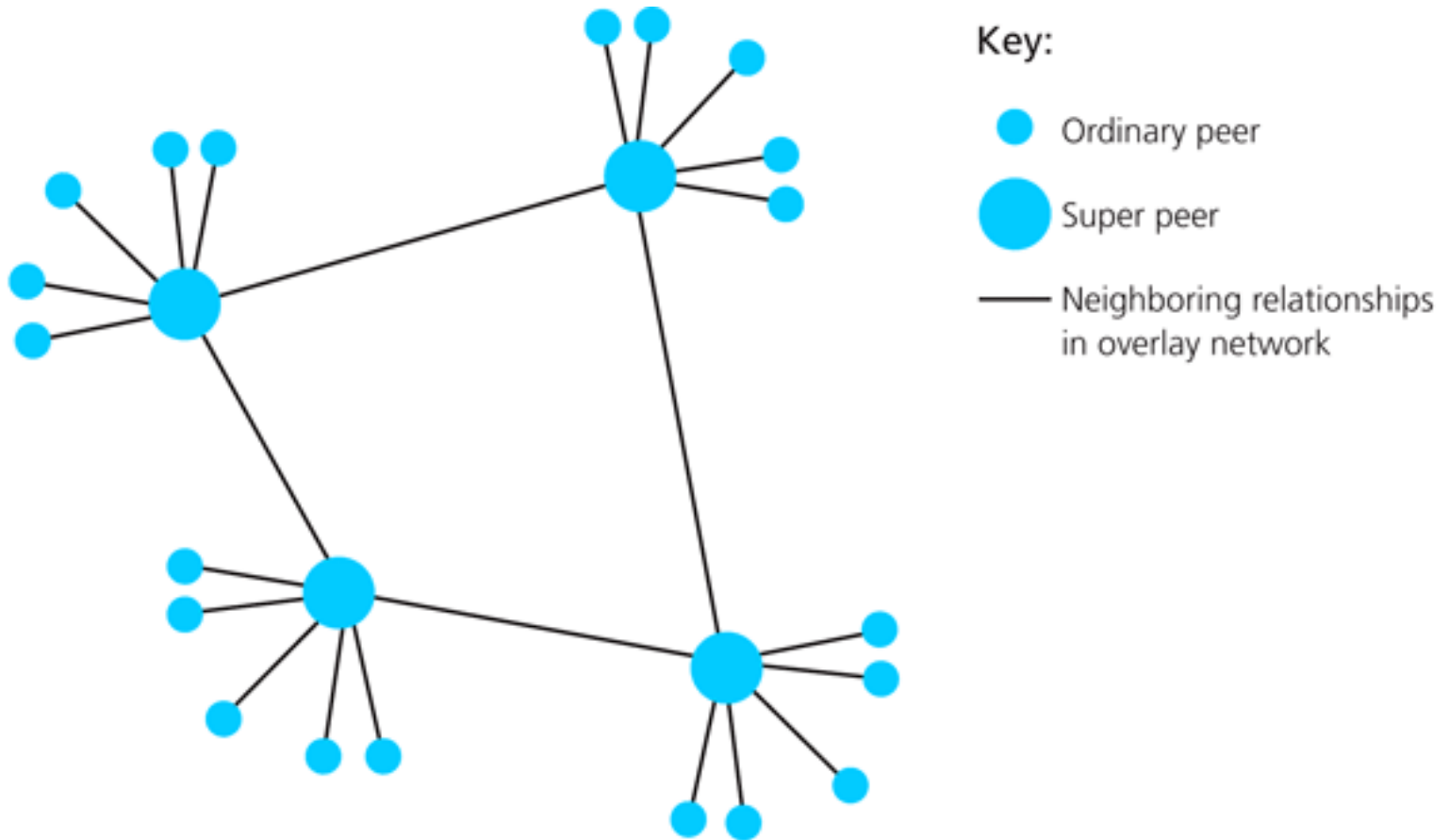


Figure 2.29 ♦ Hierarchical overlay

Distributed Hash Tables (DHTs)

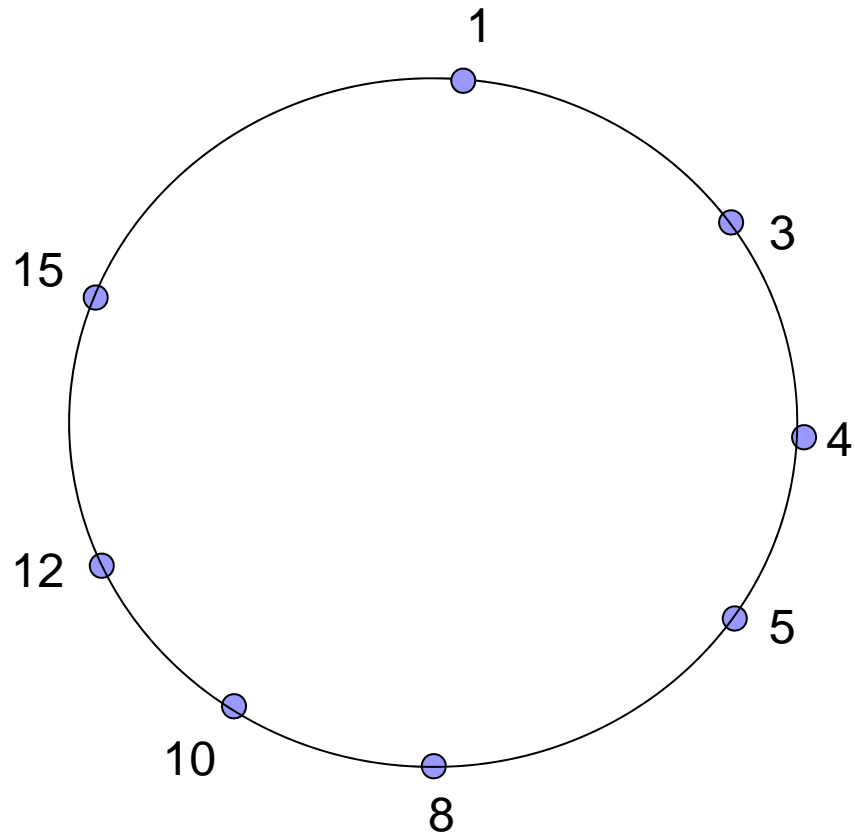
- Indexing and search technique
- (key, value) pairs
 - Query
 - Insert
- Building DB
 - Centralized approach
 - Distributed approach

Build Distributed DB or DHT

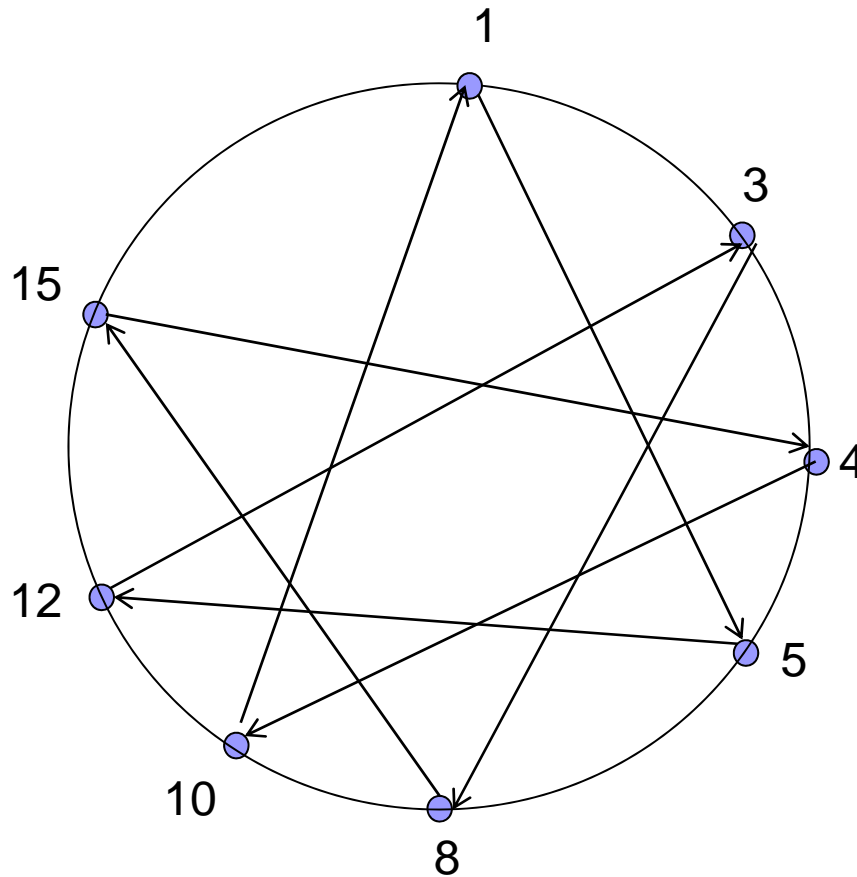
- Identifier – each peer
 - Integer
 - Hash function

- “Closest” peer

Circular DHT



Circular DHT with Shortcuts



SKYPE

- Internet Telephony
- Hierarchical overlay network
 - Super peers
 - Index
- Relays