

# CS 640 Introduction to Computer Networks

## Lecture 30

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## Today's lecture

- Peer to peer applications
  - Napster
  - Gnutella
  - KaZaA
  - Chord

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## What is P2P?

- Significant autonomy from central servers
- Exploits resources at the edges of Internet
  - Bandwidth
  - Storage
  - Processing
- Resources at edge have intermittent connectivity
- Dynamic joins and leaves

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## Applications

- P2P file sharing
  - Napster, Gnutella, KaZaA, etc.
- Storage and lookup
  - Chord, CAN, etc.
- P2P communication
  - Instant messaging
- P2P computation
  - seti@home

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## P2P file sharing software

- Allows Alice to open up a directory in her file system
  - Anyone can retrieve a file from directory
  - Like a Web server
- Allows Alice to copy files from other users' open directories:
  - Like a Web client
- Allows users to search the peers for content based on keyword matches:
  - Like Google

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## Napster

- The most (in)famous file sharing program
  - 5/99: Shawn Fanning (freshman, Northeastern U.) founds Napster Online music service
  - 12/99: First lawsuit
  - 3/00: 25% UW traffic Napster
  - 2/01: US Circuit Court of Appeals: Napster knew users violating copyright laws
  - 7/01: Simultaneous online:  
Napster 160K, Gnutella: 40K,  
Morpheus (KaZaA): 300K



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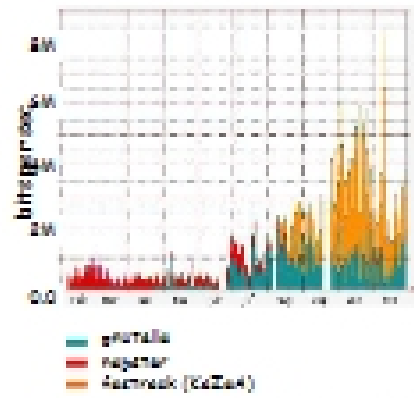
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## Napster

- Judge orders Napster to pull plug in July '01
- Other file sharing apps take over!



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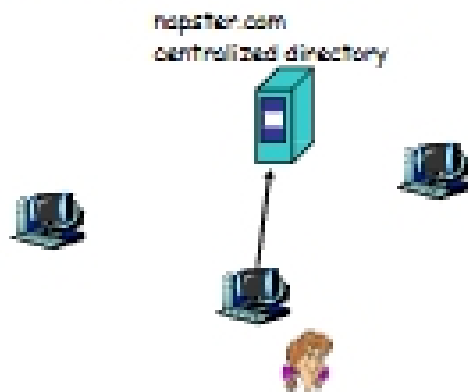
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## How Napster works

1. File list and IP address is uploaded



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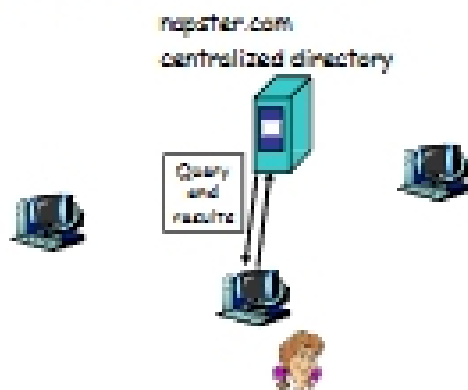
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## How Napster works

2. User requests search at server.



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