CS155b: E-Commerce

Lecture 11: February 15, 2001

Alternative Content-Distribution Methods

Digital Video Disks (DVDs)

- Developed by movie studios and consumer electronics companies in 1995.

- Compatible with CDs. Same size and thickness as CDs. Up to 25 times the storage capacity as CDs.

- TPS for DVDs includes
  - CSS encryption ("content scrambling system")
  - R/W'able copy-control marks (*e.g.,* "copy freely," "one copy," "no copies")
  - Macrovision analog copy protection
  - Other ingredients

Studios' Overall IP-Management Strategy

- Use TPS to "keep honest people honest."
- Assume (temporarily) that lack of bandwidth will prevent large-scale Internet distribution of movies.
- ★Use courts aggressively to punish (alleged) violators of existing copyright laws and *lobby heavily* for new laws that favor rights holders.

Digital Millennium Copyright Act (1998)

Illegal, except under narrowly defined special circumstances, to circumvent effective technological protection measures

Illegal to distribute circumvention tools

Gives content owners a property right in TPS as well as the content that the TPS protects. In SAT terms, circumvention is to infringement as breaking and entering is to burglary.

Examples of Allowed Circumventions

- Nonprofits may circumvention to "shop."

- Law enforcement and intelligence agencies.

- Reverse engineering to achieve interoperability.

- "Encryption research." The "researcher" has to "make a good faith effort to obtain authorization."

- Protection of "personally identifying information."

Techies' Objection to DMCA

- What is an "effective technological protection measure"? If a skilled hacker can break it, is it "effective"? If an average computer-literate person can break it, *but few do*, is it "effective"?

- Weakens incentives for content owners to pay for good IP-management technology.

- Shifts costs from content owners to society at large, by shifting responsibility from TPSs to courts and police.

- Exceptions for R&D are vague.

Coming Attraction for February 20

Ernest Miller of the Yale Law School will discuss at least one of the suits now working their ways through the courts in which the MPAA is suing people for DMCA violations. One "technological protection measure" that was circumvented was the CSS encryption scheme in the DVD system. Constitutionality of the DMCA "circumvention-tool distribution" ban is being challenged.

Gnutella P2P File Sharing

- "Pure Peer-to-Peer."

- Peers are called "servents."

- Servents communicate over standard HTTP.

- Goal is "total decentralization." In particular, no Napster-like server that "directs traffic," collects data, and otherwise centralizes control.

"A" Generates a Gnutella Request

- Creates
  - Search String S
  - (Unique) Request ID N
  - Time-to-Live T
- Sends (A, S, N, T) to all of its Gnutella neighbors.

"B" Receives Gnutella Request (A, S, N, T)

- If B has already received request N or T=0, B drops this request and does nothing.

- B looks up S in its local file system and sends (N, Result) to A.

- B sends (B, S, N, T-1) to all of its Gnutella neighbors, and it records the fact that A has made the request N.

- When B receives a response of the form (N, Result) from one of its neighbors, it forwards this response to A.

Gnutella Advantages and Disadvantages

Main Advantage : "Search for S" can be done in many ways, *e.g.*, structured database search, simple text matching, "fuzzy" text matching, etc. "Result" can take many forms.

Main Disadvantage : Inefficiency!

- "Flood" of Requests. If average number of neighbors is C and average TTL is D, each search can cause C^D request messages.
- Natural evolution into many barely-connected subnets, not one "user community."

Other Disadvantage : Request monitoring.

(Comes with standard HTTP.)
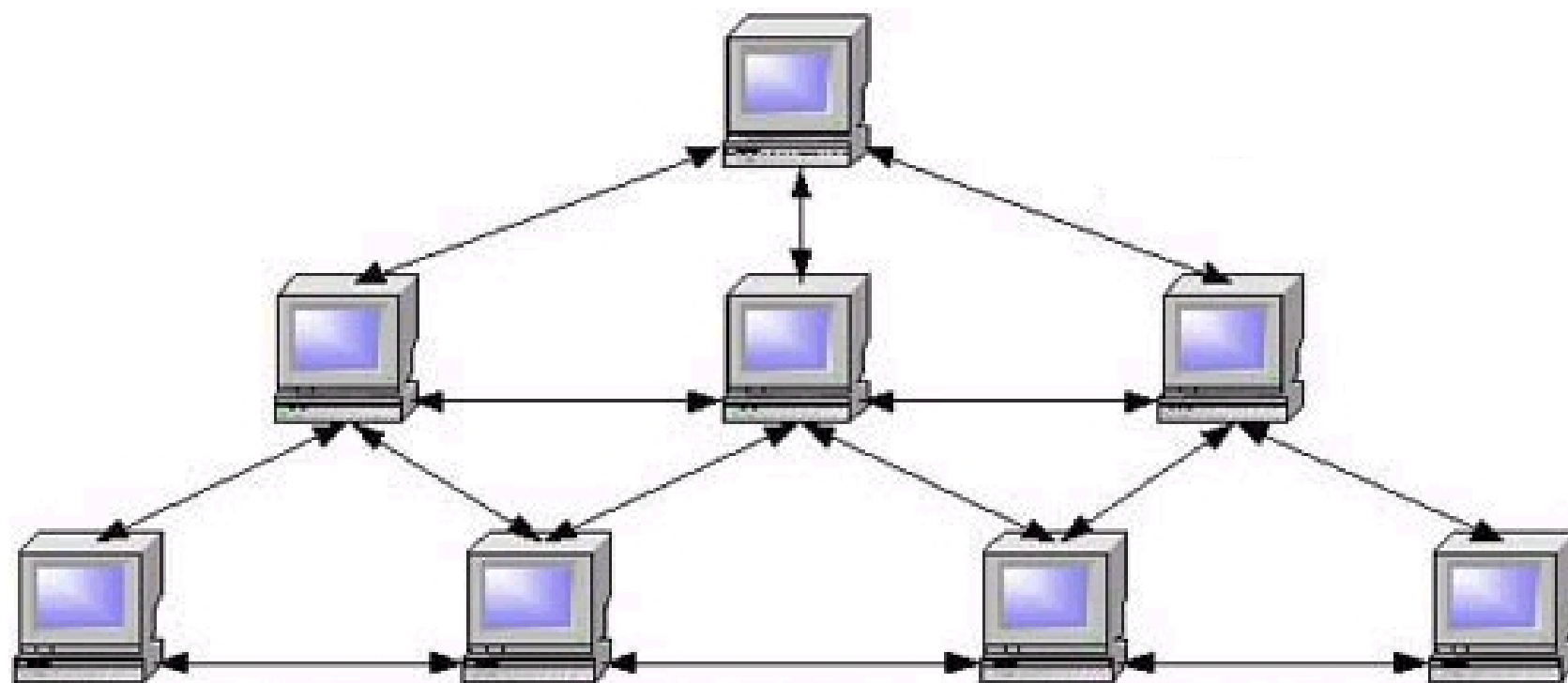
Gnutella History

- Gnutella was written by Justin Frankel, the 21-year-old founder of Nullsoft.

- Nullsoft posted Gnutella on the Web, March 1999.

- Nullsoft acquired by AOL, June 1999.

- A day later AOL yanked Gnutella, at the bequest of Time Warner.

- People had already downloaded and shared the program.

- Gnutella continues today, run by independent programmers.

Freenet P2P File Sharing

- Works similarly to Gnutella. Exceptions include:
  - Intermediaries store all results. (Diffuses responsibility.)
  - Uses proprietary protocol. (Eliminates HTTP monitorability.)
- Launched by Ian Clarke (Univ.of Edinburgh) in 1997.
- Explicitly anti-censorship, anti-copyright, and pro-anonymity in its goals.