Lecture 12
Intellectual Property

Participation Quiz

What should we call our new peer review system?

A. (your idea here)

B. (your idea here)

C. (your idea here)

D. (your idea here)

E. (your idea here)

Digital Millennium Copyright Act

- First big revision of US copyright law since 1976
- Brought US into compliance with Europe
- Extended length of copyright
- Extended copyright protection to music broadcast over Internet
- Made it illegal for anyone to
  - Circumvent encryption schemes placed on digital media
  - Circumvent copy controls, even for fair use purposes
- *It's because of the DMCA that you had to use a fake name with TurnItIn!*

Digital Rights Management

- Actions owners of IP take to protect their rights

- Approaches
  - Encrypt digital content
  - Digital marking so devices can recognize content as copy-protected

- Example: the (failed) Secure Digital Music Initiative (2000)
  - Consortium didn't stick together
  - Cracked by CS researchers

- Example: Sony BMG Rootkit (2005)
  - Made everyone angry; retracted

- Example: online music stores (2003—2009)
  - Started out with DRM, in part to lock people into platforms
  - Lately, moving away from it

DRM Example: Encrypting DVDs

- Contents of DVDs encrypted using Content Scramble System (CSS)
- Need decryption keys to view a DVD
- Jon Johansen wrote a decryption program for Linux
- 2600 Magazine published the code
- Motion picture studios sued 2600 Magazine and won
- Johansen tried in Norway and found not guilty

DRM Example: Foiling HD-DVD Encryption

- Hardware, software, and entertainment companies created Advanced Access Content System to encrypt HD-DVDs

- Encryption key posted on Digg.com
  - AACS leaned on Digg.com to censor postings containing key
  - Digg users fought back
  - AACS "expired" the key and issued a new one
  - A month later, a Digg user posted the new key

Criticisms of Digital Rights Management

- Any technological "fix" is bound to fail

- DRM undermines fair use

- DRM could reduce competition

- Some schemes make anonymous access impossible

- What do you think about DRM?

Peer-to-Peer Networks

- Peer-to-peer network
  - Transient network
  - Connects computers running same networking program
  - Computers can access files stored on each other's hard drives
- How P2P networks facilitate data exchange
  - Give each user access to data stored in many other computers
  - Support simultaneous file transfers among arbitrary pairs of computers
  - Allow users to identify systems with faster file exchange speeds

Napster

- Peer-to-peer music exchange network
- Began operation in 1999
- Sued by RIAA for copyright violations
- Courts ruled in favor of RIAA
- Went off-line in July 2001
- Re-emerged in 2003 as a subscription music service

FastTrack (Kazaa, Grokster)

- Second-generation peer-to-peer network technology
- Used by Kazaa and Grokster
- Distributes index among large number of "supernodes"
- Cannot be shut down as easily as Napster

(a)　　　　　　　　(b)
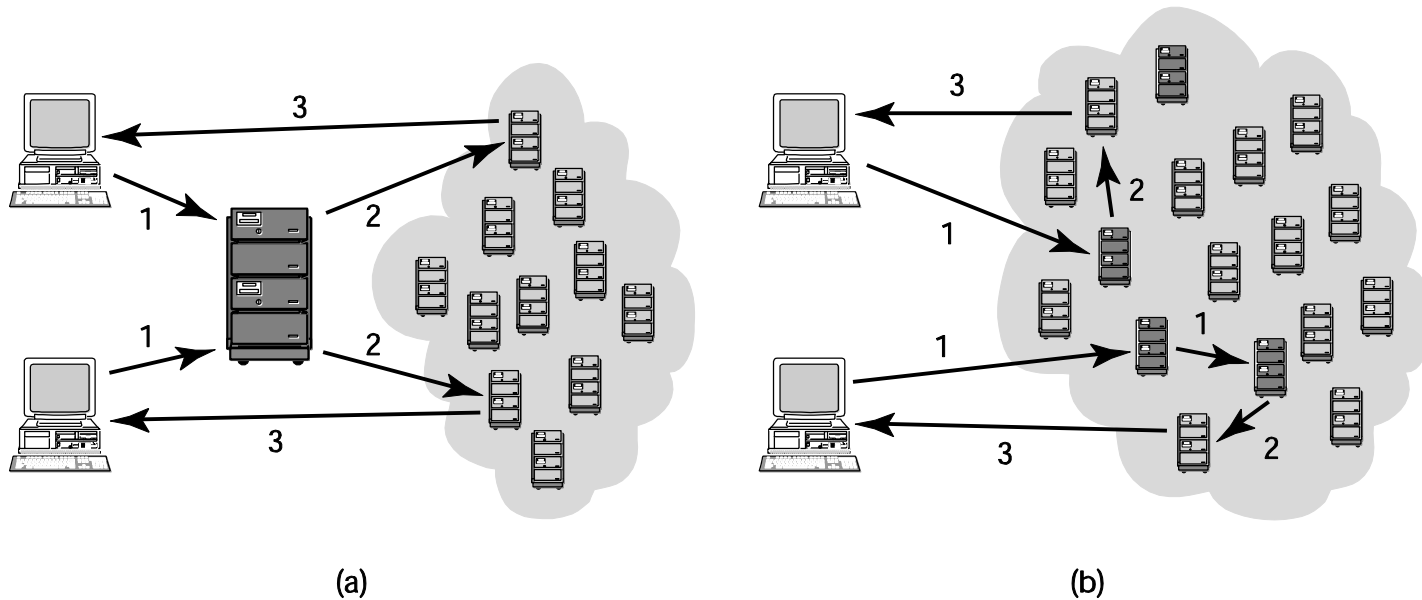
BitTorrent

- Broadband connections: download much faster than upload
- BitTorrent speeds downloading
  - Files broken into pieces
  - Different pieces downloaded from different computers
- Used for downloading large files
  - Computer programs
  - Television shows
  - Movies
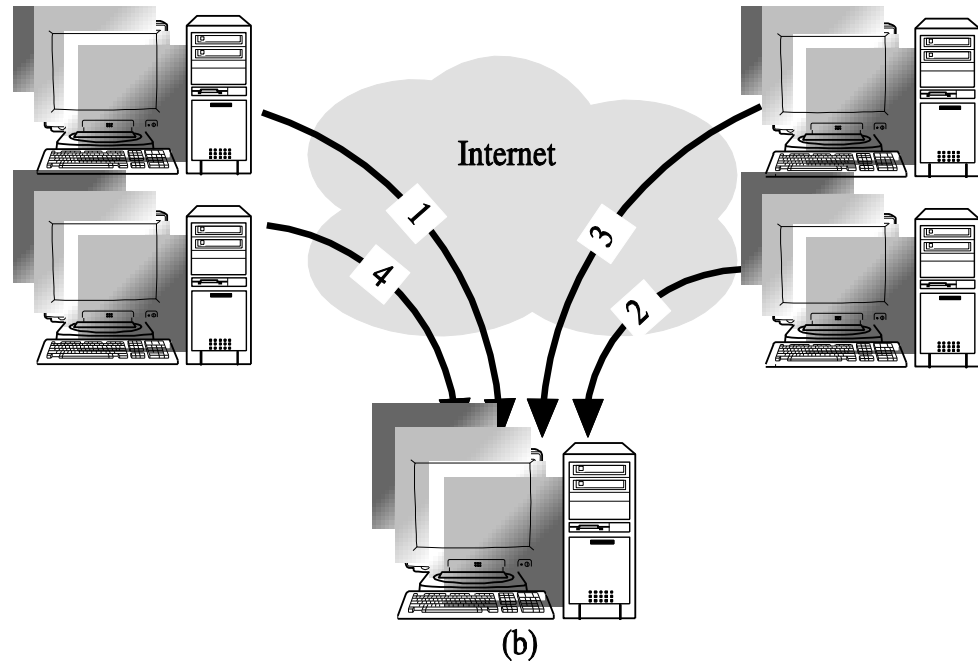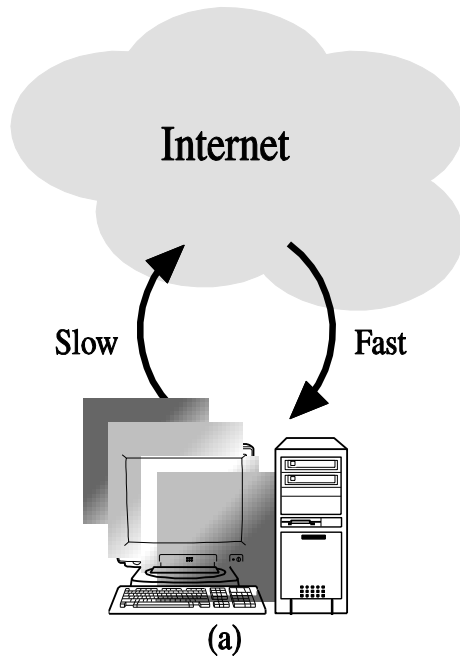
Legal Action Against P2P

- RIAA Lawsuits (2003)
  - Sued 100s of high-volume sharers
- Universities hotbed for sharing
  - Responses: banning, signing site licenses
- MGM vs. Grokster
  - Grokster won at lower levels, eventually lost at Supreme Court
  - Ruling: the technology existed primarily for infringement
- More recently: Pirate Bay…

Legal Action Against The Pirate Bay

- The Pirate Bay located in Stockholm, Sweden
  - One of world's biggest BitTorrent file-sharing sites
  - People download songs, movies, TV shows, etc.
- After 2006 raid by police, popularity increased
- In 2008 the International Federation of the Phonographic Industry sued four individuals connected with site
  - Defendants said The Pirate Bay just a search engine
  - Swedish court sentenced all four to a year in prison; group fined a total of $3.6 million
  - They lost their last appeal Feb 1, 2012
- Meanwhile, The Pirate Bay still operational
  - Shifting to hosting only "magnet links" by the end of Feb 2012
  - This will mainly make it harder to prosecute (see the blog)

Software Copyrights

- Copyright protection began 1964
- What gets copyrighted?
  - Expression of idea, not idea itself
  - Object program, not source program
- Companies treat source code as a trade secret
- Violations of copyright
  - Copying a program to give or sell to someone else
  - Preloading a program onto a computer being sold
  - Distributing a program over the Internet
- Important court cases
  - Apple Computer v. Franklin Computer
    - Established that object programs are copyrightable
  - Sega v. Accolade
    - Established that disassembling object code to determine technical specifications is fair use

Software Patents

- Patent protection began in 1981

- Inventions can be patented, but not algorithms

- Patent Office having a hard time determining prior art

- Result: some bad patents have been issued
  - Amazon One-Click purchasing

- General skepticism about value of software patents

Safe Software Development

- Reverse engineering okay

- Companies must protect against unconscious copying

- Solution: "clean room" software development strategy
  - Team 1 analyzes competitor's program and writes specification
  - Team 2 uses specification to develop software

- Interestingly, same development strategies also used to ensure that open source licenses don't "infect" commercial software

Open Source

- A variety of licenses. Some typical ingredients:
  - No restrictions preventing others from selling or giving away software
  - Source code included in distribution
  - No restrictions preventing others from modifying source code
  - No restrictions regarding how people can use software
  - Same rights apply to everyone receiving redistributions of the software (copyleft)
- GNU Project (Richard Stallman, 1984-)
  - Goal: Develop open-source, Unix-like operating system
  - Most components developed in late 1980s
- Linux
  - Linus Torvalds wrote Unix-like kernel in 1991
  - Combined with GNU components to make an OS
  - putting pressure on Microsoft, Apple, and companies selling proprietary versions of Unix

Benefits and Drawbacks of Open Source

- Benefits
  - Gives everyone opportunity to improve program
  - New versions of programs appear more frequently
  - Eliminates tension between obeying law and helping others
  - Programs belong to entire community
  - Shifts focus from manufacturing to service

- Drawbacks
  - Without critical mass of developers, quality can be poor
  - Without an "owner," incompatible versions can arise
  - Relatively weak graphical user interfaces
  - Poor mechanism for stimulating innovation (no companies will spend billions on new programs)

Creative Commons

- Under current copyright law, eligible works are copyrighted the moment they are created
- No copyright notice does not mean it's ok to copy
- Must contact people before using work
- That slows down creative reuse
- Free Creative Commons license indicates
  - Which kinds of copying are ok
  - Which rights are being retained
- Flickr and Magnatune two well-known sites using Creative Commons licenses