Lecture 13
Intellectual Property

Participation Quiz

Let X denote the set of all sets that do not contain themselves. Is it the case that $X \in X$?

A. yes

B. no

C. none of the above

1. Trade Secret

- Confidential piece of intellectual property that gives company a competitive advantage

- Never expires

- Not appropriate for all intellectual properties

- Reverse engineering allowed

- May be compromised when employees leave firm

2. Trademark, Service Mark

- Trademark: Identifies goods
- Service mark: Identifies services
- Company can establish a "brand name"
- Does not expire
- If brand name becomes common noun, trademark may be lost
- Companies advertise to protect their trademarks
- Companies also protect trademarks by contacting those who misuse them

3. Patent

- A public document that provides detailed description of invention

- Provides owner with exclusive right to the invention

- Owner can prevent others from making, using, or selling invention for 20 years

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
  - Apple: squares with rounded corners

- General skepticism about value of software patents

- *Patent trolls: what are they? What do you think?*
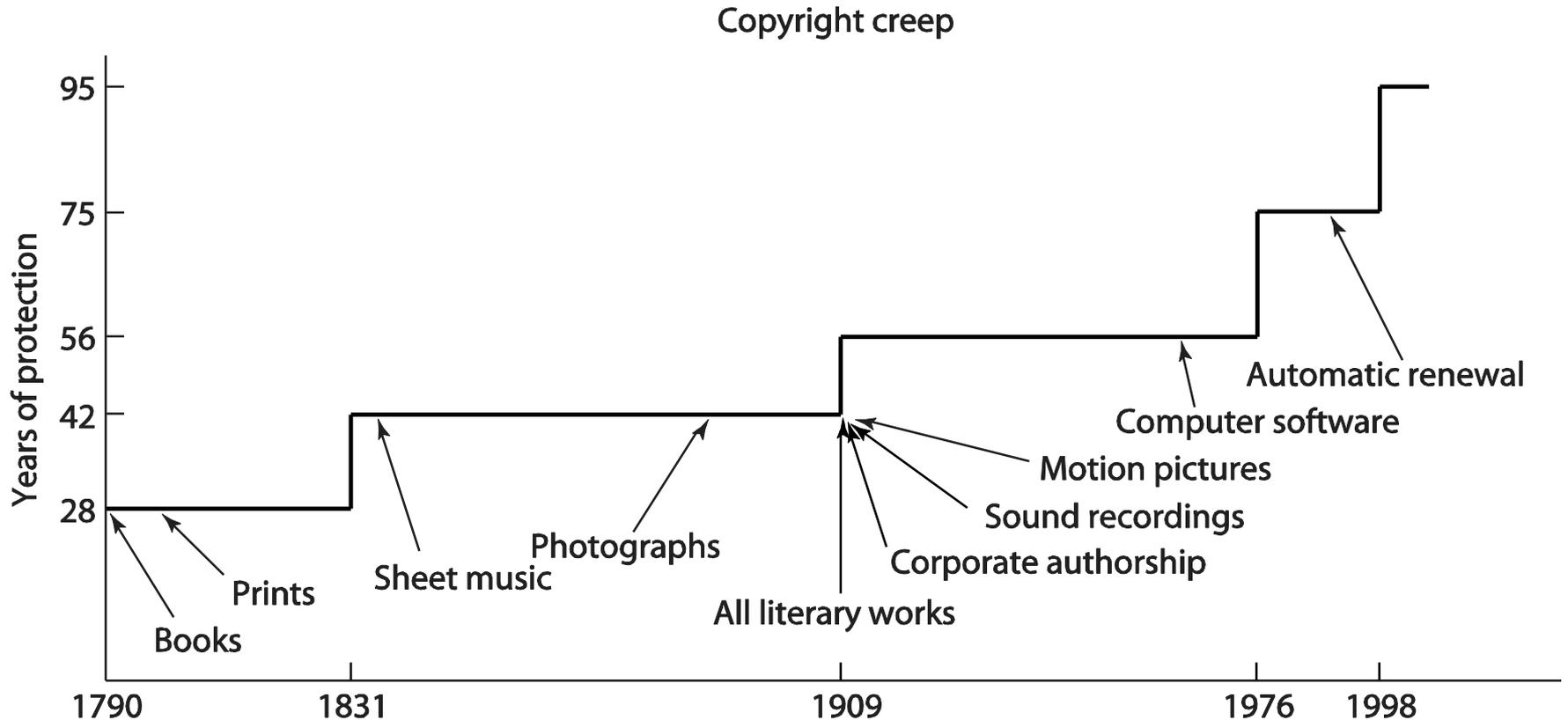
4. Copyright

- Provides owner of an original work five rights
  - Reproduction
  - Distribution
  - Public display
  - Public performance
  - Production of derivative works
- Copyright-related industries represent 5% of U.S. gross domestic product (> $500 billion/yr)
- Copyright protection has expanded greatly since 1790

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

Copyright Creep

- Since 1790, protection for books extended from 28 years to 95 years or more
    - latest extension done to prevent Disney characters from becoming public domain?
- Copyright Term Extension Act of 1998 challenged as unconstitutional
- U.S. Supreme Court disagreed: CTEA does not create perpetual copyrights

Copyright creep

Years of protection

95
75
56
42
28

Automatic renewal
Computer software
Motion pictures
Sound recordings
Corporate authorship
All literary works
Photographs
Sheet music
Prints
Books

1790   1831   1909   1976   1998

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

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

Fair Use/Fair Dealing

USA: Fair Use

- Cases where copyrighted work can be reproduced without permission
- Use can be for any purpose
- Usage must be fair
    1. Purpose, character of use
    2. Nature of work
    3. Amount of work copied
    4. Affect on market for work

Canada: Fair Dealing

- Three protected activities:
    - research or private study
    - criticism or review
    - news reporting
- Usage must be fair
    1. purpose (commercial/private)
    2. character (e.g., # copies made)
    3. amount copied from the original
    4. alternatives (was copying necessary?)
    5. nature (e.g., public availability of the copyrighted work)
   6. effect (does the copy compete with the original?)

Is it ethical to break a digital lock in order to make fair use of a copyrighted work?

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)
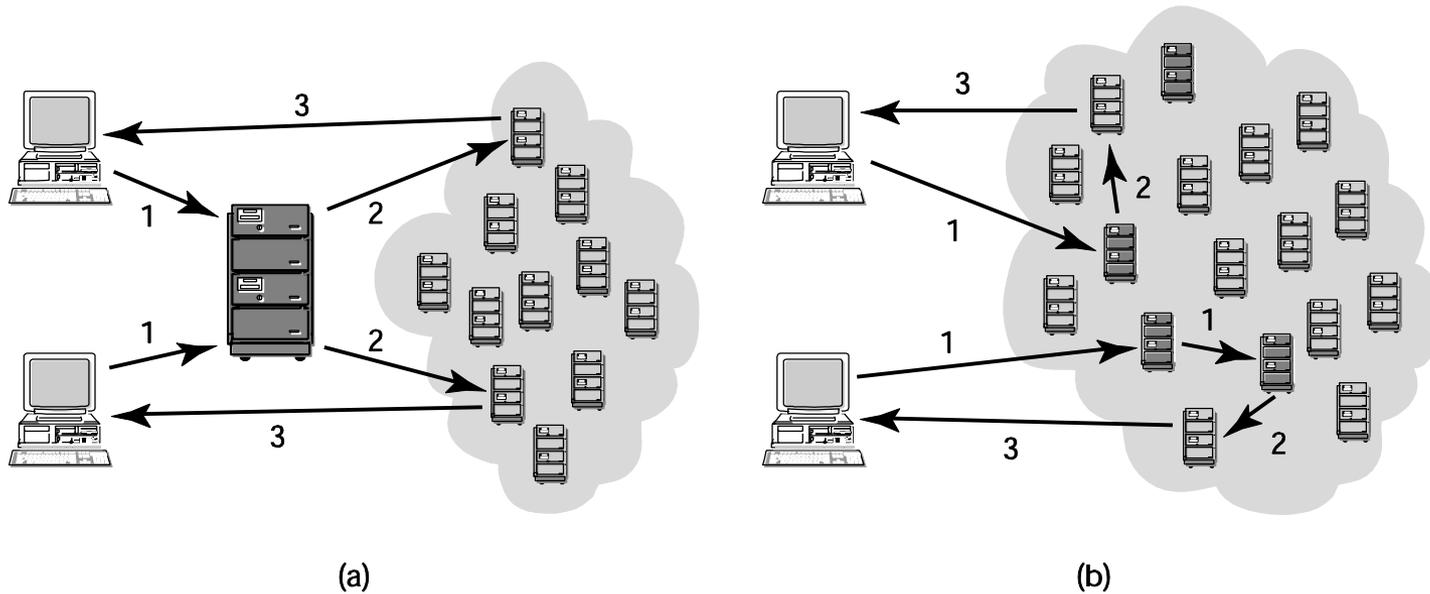
BitTorrent

- 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

(a)   (b)
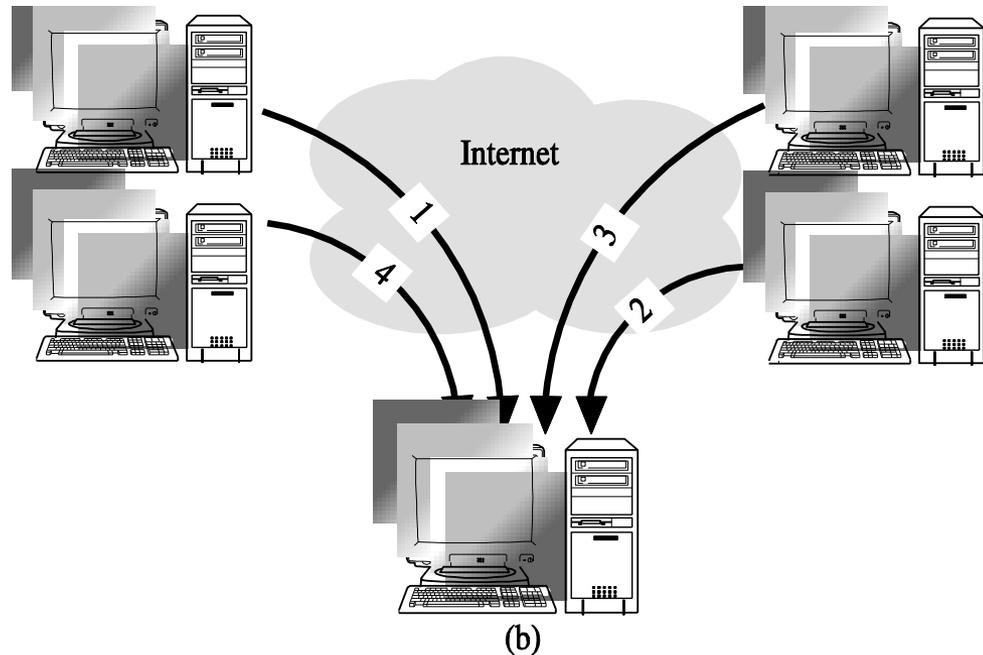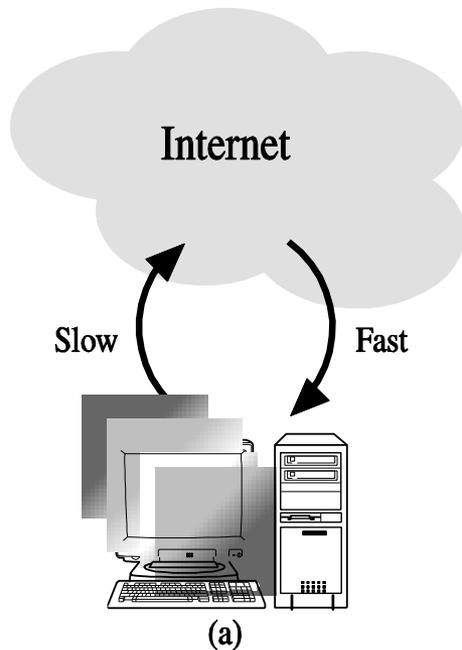
Legal Action Against P2P

- 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 prison time and fined them a total of $6.5 million
- Meanwhile, The Pirate Bay still operational
  - Shifted to hosting only "magnet links" (Feb 2012)
  - All servers just moved to the cloud (Oct 2012)

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)

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

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