

Lecture 5: Intellectual Property

(Some slides are from M. Quinn, *Ethics for the Information Age*, Pearson © 2013.)

Lecture Overview

- The Problem
- Intellectual property rights
- Protecting intellectual property
 - Trade secret and Trademark
 - Patent
 - Copyright
- How technology has challenged Copyright Fair Use
- Software as Intellectual Property
 - Copyrights
 - Patents
- The Case against Software as Intellectual Property
 - Open-Source software
 - Creative Commons
- Ethics of Software as Intellectual Property
- Lecture Summary

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The Problem

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Information Technology Changing Intellectual Property Landscape

- Copyright protection in general
 - Value of intellectual properties much greater than value of media
 - Creating first copy is costly
 - Duplicates cost almost nothing
 - Illegal copying pervasive
 - Internet allows copies to spread quickly and widely
 - Copyrighting allowed for programs
 - Must protect trade secrets
- Patent protection for software
 - 1990's allowed for "business processes" that incorporate software
 - Explosion of patents for new technology
 - Crippling the industry?

Intellectual Property Rights

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Property Rights

- Locke: *The Second Treatise of Government*
- People have a right—a right to exclude others:
 - to property in their own person
 - to their own labor and products of labor
 - to things which they remove from Nature through their labor
- As long as...
 - nobody claims more property than they can use
 - after someone removes something from common state, there is plenty left over

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What Is Intellectual Property?

- Intellectual property: any unique product of the human intellect that has commercial value
 - Books, songs, movies
 - Paintings, drawings
 - Inventions, chemical formulas, computer programs
- Intellectual property ≠ physical manifestation
 - Unlike a physical piece of property, it can have many copies
- Reward the investment of labor by paying for the use of the idea (patent) or expression of the idea (copyright)

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Benefits of Intellectual Property Protection

- Some people are altruistic; some are not. Open democratic society promotes the public good through sharing
- Allure of wealth can be an incentive for speculative work
- U.S. Constitution recognizes benefits to *limited* intellectual property protection
 - "The Congress shall have Power To.. promote the Progress of Science and the useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." (Article 1, Section 8, Clause 8)

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Limiting Intellectual Property Protection

- Giving creators rights to their inventions stimulates creativity
- Society benefits most when inventions in public domain
- Congress has struck compromise by giving authors and inventors rights for a limited time

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Prices Fall When Works Become Public Domain

Artist	Work	Previous Rental Fee	Year Became Public Domain	Purchase Price
Ravel	Daphnis et Chloe Suite no. 1	\$450.00	1987	\$155.00
Ravel	Mother Goose Suite	540.00	1988	70.00
Ravel	Daphnis et Chloe Suite no. 2	540.00	1989	265.00
Griffes	The White Peacock	335.00	1993	42.00
Puccini	O Mio Babbino Caro	252.00	1994	26.00
Respighi	Fountains of Rome	441.00	1994	140.00
Ravel	Le Tombeau de Couperin	510.00	1995	86.00
Respighi	Ancient Aires and Dances Suite no. 1	441.00	1996	85.00
Elgar	Cello Concerto	550.00	1997	140.00
Holst	The Planets	815.00	1997	300.00
Ravel	Alborada Del Gracioso	360.00	1999	105.00

Table from "Letter to The Honorable Senator Spencer Abraham," by Randolph P. Luck from LUCK'S MUSIC LIBRARY. Copyright © 1996 by Randolph P. Luck. Reprinted with permission.

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Protecting Intellectual Property

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Trade Secret

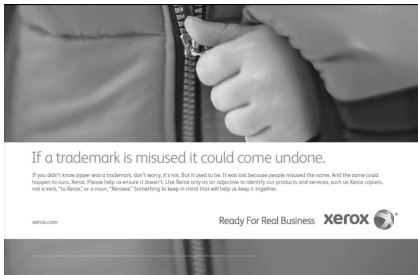
- Confidential piece of intellectual property that gives company a competitive advantage
- Never expires
- Not appropriate for all intellectual properties
- Reverse engineering allowed
- *Non-disclosure agreement* is a contract to not reveal any trade secrets
 - May be compromised when employees leave firm

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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

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Patent

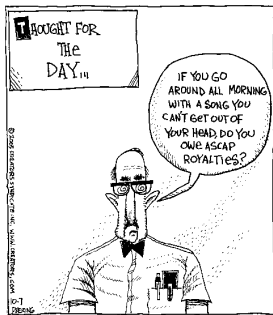
- A patent protects a novel and nonobvious idea
 - No “prior art”
- Any idea that is created by man *except* laws of nature, physical phenomena, and abstract ideas
- A public document that provides detailed description of invention approved by the government
- Provides owner with exclusive right to the invention in exchange for disclosure of how your invention works
 - Can license to others
- Owner can prevent others from making, using, or selling invention for 20 years
 - Limited monopoly, or ‘protection’

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Copyright

- Expression of an idea in musical, dramatic, artistic, architectural, audio or audiovisual work
- Registered with the government
- Provides owner of an original work five rights
 - Reproduction (make copies)
 - 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

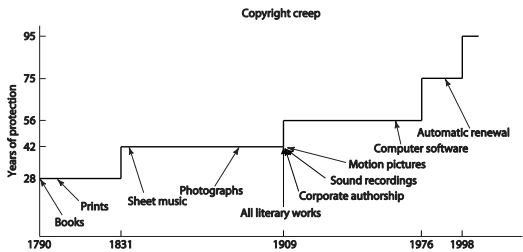
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Copyright Creep



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Copyright Creep

- Since 1790, protection for books extended from 28 years to 95 years or more
- Some suggested latest extension done to prevent Disney characters from becoming public domain
- Group of petitioners challenged the Copyright Term Extension Act (CTEA) of 1998, arguing Congress exceeded Constitutional power
- U.S. Supreme Court
 - CTEA does not create perpetual copyrights
 - CTEA is constitutional

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Fair Use Concept

- Sometimes legal to reproduce a copyrighted work without permission
- Courts consider four factors
 - Purpose and character of use
 - Nature of work
 - Amount of work being copied
 - Affect on market for work
- Examples of Fair Use:
 - Can quote short passages
 - Teaching, news reporting, research
 - Can make copies for private use

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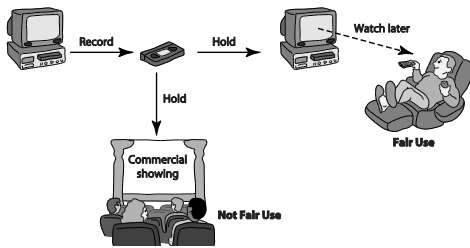
How Technology has challenged Fair Use

Sony v. Universal City Studios

- Sony introduces Betamax VCR (1975)
- People start time shifting TV shows
- Movie studios sue Sony for copyright infringements
- U.S. Supreme Court rules (5-4) that time shifting is fair use

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Time Shifting

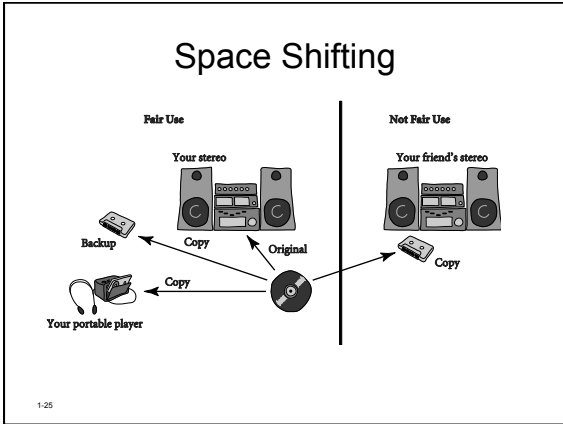


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RIAA v. Diamond Multimedia Systems

- MP3 compression allows songs to be stored in 10% of the space, with little degradation
- Diamond introduces Rio MP3 player (1998)
- People start space shifting their music
- RIAA starts legal action against Diamond for violation of the Audio Home Recording Act
- U.S. Court of Appeals, 9th Circuit, affirms that space shifting is consistent with copyright law

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Kelly v. Arriba Soft Corporation

- Kelly: Photographer maintaining Web site with copyrighted photos
- Arriba Soft: Creates search engine that returned thumbnail images
- Kelly sues Arriba Soft for copyright infringement
- U.S. Court of Appeals, 9th Circuit, affirms that use of images is a fair use

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Digital Millennium Copyright Act (DCMA) 1998

- First big revision of copyright law since 1976
- Brought U.S. 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

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Digital Rights Management (DRM)

- Actions owners of intellectual property take to protect their rights
- Approaches
 - Encrypt digital content
 - 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
 - Digital marking so devices can recognize content as copy-protected
 - SDMI (Secure Digital Music Initiative)
 - Consortium of 200 companies developed "digital watermarking" scheme
 - Failed
 - Internet copying became huge before SDMI ready
 - Some SDMI sponsors were electronics companies
 - Digital watermarking encryption cracked

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Online Music Stores and DRM

- When iTunes Music Store opened, all music was protected with a DRM scheme called FairPlay
- FairPlay blocked users from freely exchanging purchased music
 - Songs couldn't be played on more than 5 different computers
 - Songs couldn't be copied onto CDs more than 7 times
 - Songs from iTunes Store wouldn't play on non-Apple devices
 - DRM-protected music purchased from other online retailers couldn't be played on iPod
- Online Music Stores Drop Digital Rights Management
 - Consumers complained
 - European governments put pressure on Apple to license FairPlay or stop using DRM
 - Amazon reached an agreement with all four major music labels to sell DRM-free music
 - Apple followed suit in 2009

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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

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Peer-to-Peer Networks Facilitate Data Exchange

- 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

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Tired of being treated like a criminal for sharing music online?

You're in good company. Over 60 million other music fans use peer-to-peer programs like Kazaa and Morphix to share their favorite tunes. Yet the record labels are bullying ISPs and busting down college kids in an effort to shut down file sharing.

It's not time for a new approach? The Electronic Frontier Foundation thinks so. We believe the answer lies in a model that fairly compensates artists while supporting music lovers. Join EFF today so the music can play on.

File Sharing: It's Music to our Ears

Stand up for your right to share the music you love!
Join EFF today at www.eff.org/share.

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P2P Technologies

- Napster
 - P2P music exchange network 1999
- FastTrack
 - Second-generation used by KaZaA and Grokster
 - Distributes index among large number of "supernodes"
 - Cannot be shut down as easily as Napster
- Bit Torrent
 - Broadband connections: download much faster than upload
 - Files broken into pieces
 - Different pieces downloaded from different computers
 - Used for downloading large files: computer programs, TV shows, movies

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RIAA (Recording Industry Association of America) sues P2P

- Napster 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
- RIAA warned file swappers they could face legal penalties, April 2003
 - Subpoenaed Verizon for identities of people suspected of running supernodes
 - Judge ruled in favor of Verizon
 - September 2003: RIAA sued 261 individuals
 - December 2003: U.S. Court of Appeals ruled Verizon did not have to give customer names to RIAA
 - Huge Jury Judgments Overturned
 - Jammie Thomas-Rassert
 - * Federal jury ordered her to pay \$1.92 million, Damages reduced to \$54,000
 - Joel Tenenbaum
 - * Jury ordered him to pay \$675,000, Judge reduced award to \$67,500
 - Does RIAA have to prove someone actually copied the songs that people made available on Kazaa?
 - * New York decision: No; Massachusetts, Arizona decisions: Yes

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More Lawsuits against P2P

- MGM sued Grokster for copyright infringements by their users
 - Lower courts
 - * Granted Grokster and StreamCast a summary judgement
 - * Cited *Sony v. Universal City Studios* as a precedent
 - U.S. Supreme Court
 - * Reversed the lower court ruling in June 2005
 - * Proper precedent *Gershwin Publishing Corporation v. Columbia Artists Management*
- International Federation of the Phonographic Industry sued four users of The Pirate Bay
 - One of world's biggest BitTorrent file-sharing sites: songs, movies, TV shows, etc.
 - * Located in Stockholm, Sweden
 - * After 2006 raid by police, popularity increased
 - Lawsuit 2008
 - * Defendants said The Pirate Bay just a search engine
 - * Found guilty; sentenced to prison and fined \$6.5 million
 - * Meanwhile, The Pirate Bay still operational

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Legal Music Services on the Internet

- Subscription services for legal downloading
- Some based on monthly fee; some free
- Consumers pay for each download
- Apple's iTunes Music Store leading service, surpassing WalMart as top music retailer in United States
- Still, illegal downloading far more popular than legal music services

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Software as Intellectual Property

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Software Copyrights

- Copyright protection began 1964
- What gets copyrighted?
 - Expression of idea, not idea itself
 - Object program, not source program although registration is of portions of source code
- Companies can treat source code as a trade secret
- A “computer program” is a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result.
- Copyright protection extends to all the copyrightable expression embodied in the computer program
- Copyright protection is not available for ideas, program logic, algorithms, systems, methods, concepts, or layouts

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Violations of Software Copyrights

- Copying a program to give or sell to someone else
- Preloading a program onto the hard disk of a computer being sold
- Distributing a program over the Internet

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Important Court Cases

- *Apple Computer v. Franklin Computer (1983)*
 - Established that object programs are copyrightable
- *Sega v. Accolade (1992)*
 - Established that disassembling object code to determine technical specifications is fair use
- *Apple v. Microsoft 1994*
 - Apple lost: GUI “look and feel” could not be copyrighted

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Software Patents (1/3)

- Until 1981, Patent Office refused to grant software patents
 - Saw programs as mathematical algorithms, not processes or machines
- U.S. Supreme Court decision led to first software patent in 1981
- 1998 allowed “business process” that produces “a useful, concrete and tangible result”

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What is a “business process”?

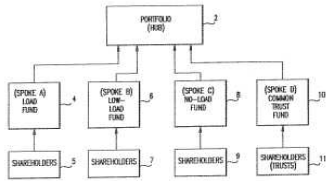
DATA PROCESSING SYSTEM FOR HUB AND SPOKE FINANCIAL SERVICES CONFIGURATION

- Signature Financial Group
- US Patent 5193056
- *State Street Bank v. Signature Financial Group*
 - Patent at the center of a US Federal Circuit judgment in 1998
 - Confirmed that business methods implemented on a computer are patentable in the US since they produced a “useful, concrete and tangible result”. [3]
 - Claims of corresponding European patent application were rejected by the European Patent Office (EPO) as relating to unpatentable subject matter.

DATA PROCESSING SYSTEM FOR HUB AND SPOKE FINANCIAL SERVICES CONFIGURATION

- A data processing system is provided for monitoring and recording the information flow and data, and making all calculations, necessary for maintaining a partnership portfolio and partner fund (Hub and Spoke) financial services configuration. In particular, the data processing system makes a daily allocation of assets of two or more funds (Spokes) that are invested in a portfolio (Hub). The data processing system determines the percentage share (allocation ratio) that each fund has in the portfolio, while taking into consideration daily changes both in the value of the portfolio's investment securities and in the amount of each fund's assets. The system also calculates each fund's total investments based on the concept of a book capital account, which enables determination of a true asset value of each fund and accurate calculation of allocation ratios between the funds. The data processing system also tracks all the relevant data, determined on a daily basis for the portfolio and each fund, so that aggregate year-end data can be determined for accounting and for tax purposes for the portfolio and for each fund.

DATA PROCESSING SYSTEM FOR HUB AND SPOKE FINANCIAL SERVICES CONFIGURATION



Software Patents (2/3)

- Thousands of software patents now exist
 - Microsoft files ~3,000 applications annually
 - Licensing patents a source of revenue
- Secondary market for software patents
 - Patent trolls: Companies that specialize in buying patents and enforcing patent rights
 - Companies would rather settle out of court than spend time and money going to trial
 - RIM didn't settle quickly; ended up paying \$612 million

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Software Patents (3/3)

- Critics say too many patents have been issued
 - Patent Office doesn't know about prior art, so it issues bad software patents
 - Obvious inventions get patents
- Companies with new products fear getting sued for patent infringement
 - Build stockpiles of patents as defense mechanism
 - Software patents used as legal weapons
- Bezos: software patents should expire in 3-5 years

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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

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The Case against Software as Intellectual Property

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Consequences of Proprietary Software

- Increasingly harsh measures being taken to enforce copyrights and patents
- Copyrights and patents are not serving their purpose of promoting progress
- It is wrong to allow someone to "own" a piece of intellectual property
- Software is not like other forms of creative expression and innovation
 - Source code is like a literary creation (copyright)
 - Software is also functional and not like other copyrightable creations
 - "Look and Feel" can't be copyrighted
 - Software behaves like a machine or industrial process (patent)
 - It is innovative but not inventive like a copyright
 - Software should not be copyrightable or patentable (Stallman)

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Open-Source Software

- Definition
 - 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 with modifications (*copyleft license*)

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Benefits of Open-Source Software

- 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
- Can verify what the program is doing
 - Correctness and completeness
 - Security

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Examples of Open-Source Software

- BIND
- Apache
- Sendmail
- Android operating system for smartphones
- Firefox
- OpenOffice.org
- Perl, Python, Ruby, TCL/TK, PHP, Zope
- GNU compilers for C, C++, Objective-C, Fortran, Java, and Ada

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Why OpenOffice.org

OpenOffice.org - home of the world's leading open-source office suite

Why Great Software Easy to use and it's free

**Great Software...
... Easy to Use ...
... and it's Free!**

OpenOffice.org

OpenOffice.org 3 is the leading open-source office software suite for word processing, spreadsheets, presentations, graphics, databases and more. It is available in many languages and works on all common computers. It stores all your data in an international open standard format and can also read and write files from other common office software packages. It can be downloaded and used completely free of charge for any purpose.

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Governments Education Businesses Not for profits IT Businesses F/OSS advocates

Great software Easy to use and it's free

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GNU Project and Linux

- GNU Project
 - Begun by Richard Stallman in 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 O.S.
 - Commonly called Linux

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Impact of Open-Source Software

- Linux putting pressure on companies selling proprietary versions of Unix
- Linux putting pressure on Microsoft and Apple desktops

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Critique of the Open-Source Software Movement

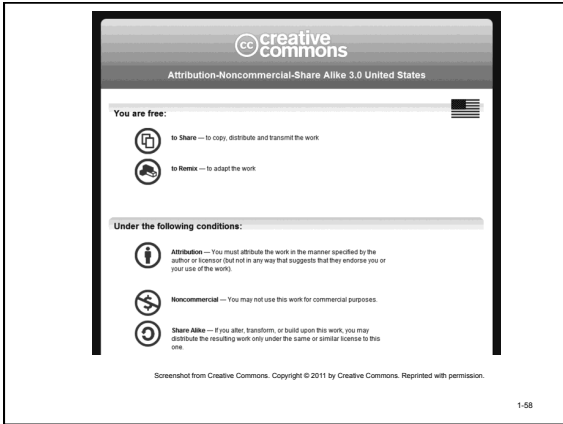
- Without critical mass of developers, quality can be poor
- Without an "owner," incompatible versions may arise
- Relatively weak graphical user interface
- Poor mechanism for stimulating innovation (no companies will spend billions on new programs)

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Creative Commons: Streamlining Creative Re-use

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

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Ethics of Software as Intellectual Property

Ethics of Software as Intellectual Property

- *Should* society give intellectual property protection to software
- Not discussing morality of breaking the law

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Natural Right Analysis

- Argument to protect software as property
 - Right to your own mental labor
 - Programming is hard work that only a few can do
 - Programmers should be rewarded for their labor
 - They ought to be able to own their programs
- Criticism against these claims
 - Why does labor imply ownership?
 - Can imagine a just society in which all labor went to common good
 - Intellectual property not like physical property

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Utilitarian Analysis

- Argument to protect software as property
 - Copying software reduces software purchases...
 - Leading to less income for software makers...
 - Leading to lower production of new software...
 - Leading to fewer benefits to society
- Criticism against these claims
 - Not all who get free copies can afford to buy software
 - Open-source movement demonstrates many people are willing to donate their software-writing skills
 - Hardware industry wants to stimulate software industry
 - Difficult to quantify how much society would be harmed if certain software packages not released

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Ethics Conclusion

- Natural rights argument weak
- Utilitarian argument not strong, either
- Nevertheless, society has granted copyright and patent protection to owners of computer programs
- Breaking the law is wrong unless there is a strong overriding moral obligation or consequence

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Lecture Summary

- ### Summary (1/3)
- Technological innovation has limited the success of prior copyright law
 - Constraints regarding physical copying no longer apply and allow individual copying of
 - Digital representation of sound and pictures
 - Improvements in compression (MP3), cheap massive storage, & broadband
 - Internet open architecture with content-blind packet switching
 - Response has been to overprotect copyright of intellectual property
 - Limits or eliminates Limited Term and Fair Use
 - Balance needs to be made

- ### Summary (2/3)
- Technological Fix for intellectual property piracy
 - Problem: Internet open architecture with content-blind packet switching
 - Solution: Software defined networking (SDN) could create content-based routing, in which the content of a packet determines its destiny
 - It turns routing into something that's closer to the way Twitter works as opposed to how the U.S. Postal System does. For example you would look at the content of a packet and route it to people who said they want to receive that information. It becomes multi-cast instead of a one-to-one connection.
 - Vint Cerf at Google proposes this:
<http://gigaom.com/2013/04/16/googles-vint-cerf-explains-how-to-make-sdn-as-successful-as-the-internet/>

Summary (3/3)

- Patents: Allowing “business process” allows almost anything to be patented that contains software
 - Choking the software industry with lawsuits
 - Stifling innovation
- Software is not like other forms of creative innovation and expression
 - Source code is like a literary creation (copyright)
 - Software is also functional and not like other copyrightable creations
 - “Look and Feel” can’t be copyrighted
 - Software behaves like a machine or industrial process (patent)
 - It is innovative but not inventive like a copyright
 - Perhaps it shouldn’t be copyrighted or patented
 - Open Source
 - Creative Commons
- Software as intellectual property is difficult to defend ethically
 - Until things change, violating copyrights and patents is breaking the law
