INTELLECTUAL PROPERTY

CSE 312 – Legal, Social, and Ethical Issues in Information Systems

Stony Brook University

http://www.cs.stonybrook.edu/~cse312

"The Congress shall have Power To . . . promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries..."

—U.S. Constitution, Article I, Section 8, Clause 8

CH 4: INTELLECTUAL PROPERTY

4.1 Principles and Laws
4.2 Significant Fair Use Cases and Precedents
4.3 Reponses to Copyright Infringement
- 4.2.1 Defensive and Aggressive Responses From the Content Industries
- 4.2.2 The Digital Millennium Copyright Act: Anti-circumvention
- 4.2.3 The Digital Millennium Copyright Act: Safe Harbor

4.4 Search Engines and Online Libraries
4.5 Free Software
4.6 Patents for Software Inventions

(261)

Anno Octavo

Annæ Reginæ.

An Act for the Encouragement of Learning, by vesting the Copies of Printed Books in the Authors or Purchasers of such Copies, during the Times therein mentioned.

Whereas Printers, Booksellers, and other Persons have of late frequently taken the Liberty of Printing, Reprinting, and Publishing, or causing to be Printed, Reprinted, and Published Books, and other Writings, without the Consent of the Authors or Proprietors of such Books and Writings, to their very great Detriment, and too often to the Ruin of them and their Families: For Preventing therefore such Practices for the future, and for the Encouragement of Learned Men to Compose and Write useful Books; May it please Your Majesty, that it may be Enacted, and be it Enacted by the Queens most Excellent Majesty, by and with the Advice and Consent of the Lords Spiritual and Temporal, and Commons in this present Parliament Assembled, and by the Authority of the same, That from and after the Tenth Day of April, One thousand seven hundred and ten, the Author of any Book or Books already Printed, who hath not Transferred to any other the Copy or Copies of such Book or Books, Share or Shares thereof, or the Bookseller or Booksellers, Printer or Printers, or other Person or Persons, who hath or have Purchased or Acquired the Copy or Copies of any Book or Books, in order to Print or Reprint the same, shall have the sole Right and Liberty of Printing such Book and Books for the Term of One and twenty Years, to Commence from the said Tenth Day of April, and no longer: and that the Author of any Book or Books already Composed and not Printed and Published, or that shall hereafter be Composed, and his Assigns, or Assigns, shall have the sole Liberty of Printing and Reprinting such Book and Books for the Term of Four-

teen

4.1 PRINCIPLES AND LAWS

What is Intellectual Property?

- The intangible creative work, not its particular physical form
- Value of intelligence and artistic work comes from creativity, ideas, research, skills, labor, non-material efforts and attributes the creator provides
- Protected by copyright and patent law
  - Copyright is a legal concept that defines rights to certain kinds of intellectual property
  - Copyright protects creative works such as books, articles, plays, songs (both music and lyrics), works of art, movies, software, and videos
  - Facts, ideas, concepts, processes, and methods of operation are not copyrightable

PRINCIPLES AND LAWS

What is Intellectual Property?

- Patents protect inventions
  - An invention of any new, useful, and non-obvious process, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof.
  - Patents protect the idea.
  - A patent is a set of exclusive rights granted by a sovereign state to an inventor or assignee for a limited period of time in exchange for detailed public disclosure of an invention.
  - Patentability requirements: novelty, usefulness, and non-obviousness.
  - The exclusive right granted to a patentee is the right to prevent others from commercially making, using, selling, importing, or distributing a patented invention without permission
  - Since The Venetian Patent Statute of March 19, 1474

PRINCIPLES AND LAWS

Trademark

Registered Trademark

What is Intellectual Property?

- Trademark: is a recognizable name, word, sign (logo), design, or expression which identifies products or services of a particular source from those of others
  - Protects both manifestation and idea.
- Trade secret: a secret device or technique used by a company in manufacturing its products.
  - Can be a formula, practice, process, design, instrument, pattern, commercial method, or compilation of information not generally known or reasonably ascertainable by others by which a business can obtain an economic advantage over competitors or customers

PRINCIPLES AND LAWS

Intellectual property protection

- Protects the intangible creative work
  - When we buy a novel, we are buying a physical collection of paper and ink or an electronic-book file.
  - We are not buying the intellectual property - that is, the plot, the organization of ideas, the presentation, the characters, and the events that form the abstraction
    - that is the intangible "book"
  - We are buying the right to read/watch it
  - We may not make copies
    - same applies for music, video, software
  - We don't have the right to play it in a public venue or charge a fee.

PRINCIPLES AND LAWS

Intellectual property protection

- Protects the right of artists, authors, and inventors to compensation for what they create
  - The value of a book is much more than printing it
  - The value of a painting is higher than the cost of the canvas and paint used to create it
  - The value of intellectual and artistic works comes from the creativity, ideas, research, skills, and labor that the creators provided
  - Our property rights to the physical property we buy includes using it

PRINCIPLES AND LAWS

Discussion Question

- *How is intellectual property different than physical property?*

PRINCIPLES AND LAWS

Intellectual property protection

- Copyrights last for a limited time—for example, the lifetime of the author plus 70 years
- U.S. copyright law (Title 17 of the U.S. Code) gives the copyright holder the following exclusive rights:
  - To make copies of the work
  - To produce derivative works, such as translations into other languages or movies based on books
  - To distribute copies
  - To perform the work in public (e.g., music, plays)
  - To display the work in public

PRINCIPLES AND LAWS

Challenges of New Technology

"*New technologies have been disrupting existing equilibria for centuries, yet balanced solutions have been found before*."

—Pamela Samuelson,

Berkeley Law

Berkeley
UNIVERSITY OF CALIFORNIA

PRINCIPLES AND LAWS

Challenges of New Technology

- Digital technology and the Internet make copyright infringement easier and cheaper.
  - Photocopiers made copying of printed material easy
  - New compression technologies make copying large files (e.g. graphics, video and audio files) feasible.
  - Search engines make finding material easier.
  - Peer-to-peer technology makes transferring and sharing files easier.

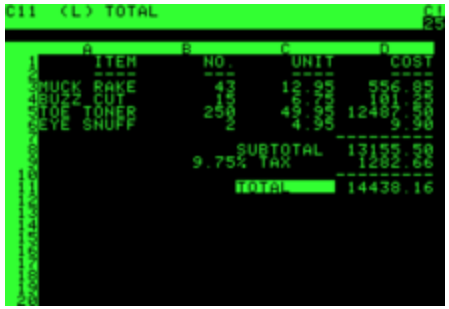
PRINCIPLES AND LAWS

Challenges of New Technology (cont.)

- Miniaturization of cameras and other equipment enable audience members to record and transmit events.
- Scanners allow us to change the media of a copyrighted work, converting printed text, photos, and artwork to electronic form.
- New tools allow us to modify graphics, video and audio files to make derivative works.
- Social media made it easy to share photos and videos

PRINCIPLES AND LAWS

- The first category of intellectual property to face significant threats from digital media was computer software itself
  - word processing programs
  - spreadsheet programs
  - operating systems
  - utilities
  - games



- Copying software used to be common practice: "once considered a standard and acceptable practice (if it were considered at all)"
  - *warez:* unauthorized copies of software
- Software publishers began using the term "*software piracy*" for high-volume, unauthorized copying of software

PRINCIPLES AND LAWS

- The audio data compression format MP3, introduced in the mid-1990s, reduced the size of audio files by a factor of about 10–12.
  - People could download an MP3 song from the Internet in a few minutes
  - MP3 has no mechanism for preventing unlimited or unauthorized copying

PRINCIPLES AND LAWS

A bit of history

- 1790 first copyright law passed in US that covered books, maps, and charts (1710 in UK)
- Copyright Act of 1909 defined an unauthorized copy as a form that could be seen and read visually
  - covered photography, also sound recordings and movies
- 1970s: software was copied
  - A company copied the software for a chess game from the ROM chip (read-only-memory) of the creator company
    - Because the ROM could not be read visually, a court held that the copy did not infringe the program's copyright

PRINCIPLES AND LAWS

A bit of history

- 1976 and 1980 copyright law revised to include software and databases that exhibit "authorship" (original expression of ideas), under "fair use" (see later)
  - 1976 law stated that the copy is in violation if the original can be perceived, reproduced, or otherwise communicated by or from the copy, directly or indirectly – an improvement over "seen and read visually"
- 1982 high-volume copying became a felony
- 1992 making multiple copies for commercial advantage and private gain became a felony
  - >10 copies, worth >$2,500 get up to 5 yrs in jail

PRINCIPLES AND LAWS

A bit of history

- The No Electronic Theft Act of 1997 made it a criminal offense to willfully infringe copyright (for works with total value of more than $1000 within a six-month period) even if there is no commercial advantage or private gain
  - The penalties can be severe

PRINCIPLES AND LAWS

A bit of history

- 1998 Digital Millennium Copyright Act (DMCA) prohibits making, distributing or using tools to circumvent technological copyright protection systems and included protection from some copyright lawsuits for Web sites where users post material
  - Safe-harbor provisions: Protects Web sites if they remove material when asked by the copyright holder, which offered protection from some copyright lawsuits for Web sites where users post materials
- 2005 Congress made it a felony to record a movie in a movie theater

PRINCIPLES AND LAWS

Fair Use Doctrine

- Copyright law and court decisions attempt to define the rights of authors and publishers consistent with two goals:
  - promoting production of useful work and
  - encouraging the use and flow of information
- The fair use doctrine allows uses of copyrighted material that contribute to the creation of new work (such as quoting part of a work in a review) and uses that are not likely to deprive authors or publishers of income for their work.
  - Education (even making multiple copies for classroom use)

PRINCIPLES AND LAWS

Fair Use Doctrine

- The 1976 law identifies possible fair uses, such as "*criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research*"

PRINCIPLES AND LAWS

Fair Use Doctrine

- Four factors considered
  1. Purpose and nature of use – commercial or nonprofit purposes
  2. Nature of the copyrighted work
  3. Amount and significance of portion used
  4. Effect of use on potential market or value of the copyright work (will it reduce sales of work?)
- No single factor alone determines
- Not all factors given equal weight, varies by circumstance

PRINCIPLES AND LAWS

Ethical arguments about copying

- Copying or distributing a song or computer program does not decrease the use and enjoyment any other person gets from his or her copy.
- Copying can decrease the amount of money that the copyright owner earns.
  - That is the aspect of the property that one can steal from the copyright holder
- The fact that some people copy for personal use and do not profit is irrelevant
  - Vandals do not profit financially from their action, but vandalism is unethical (and a crime) because it destroys—or reduces the value of—someone's property

PRINCIPLES AND LAWS

- Arguments people make in support of personal copying or posting content on the Web without authorization
  - "I cannot afford to buy the software or movie or pay the royalty for use of a song in my video" or
  - "I wouldn't buy it at the retail price (or pay the required fee) anyway. The company does not lose income"
    - There are many things that I cannot afford, but it does not justify just taking it
  - "The company is a large, wealthy corporation"
    - The size and success of the company does not justify taking software: programmers lose income
  - "Making a copy for a friend is just an act of generosity"
  - "This violation is insignificant compared to the billions of dollars lost to piracy by dishonest people making big profits"
  - "Everyone does it. You would be foolish not to"
    - The number of people doing something does not determine whether it is right.

4.2 SIGNIFICANT FAIR USE CASES AND PRECEDENTS

- Sony v. Universal City Studios (1984)
  - The Sony case was the first case about private, noncommercial copying of copyrighted work that the Supreme Court decided
  - Two movie studios sued Sony for contributing to copyright infringement because some customers used its Betamax video cassette recording machines to record movies shown on television
  - 2 issues:
    - whether copyright owners can sue makers of copying equipment because some buyers use the equipment to infringe copyrights
    - whether recording a movie for personal use was a copyright infringement or a fair use

Significant Fair Use Cases and Precedents

- Sony v. Universal City Studios (1984)
  - Arguments against fair use
    - People copied the entire work (against Fair use principle 3)
    - Movies are creative, not factual (against Fair use principle 2)

Significant Fair Use Cases and Precedents

- Sony v. Universal City Studios (1984)
  - Arguments for fair use
    - The copy was for private, noncommercial use and generally was not kept after viewing (Fair use 1)
    - The movie studios could not demonstrate that they suffered any harm (Fair use 4)
    - The studios had received a substantial fee for broadcasting movies on TV, and the fee depends on having a large audience who view for free (~Fair use 2)

Significant Fair Use Cases and Precedents

- Sony v. Universal City Studios (1984)
  - Supreme Court decided that the makers of a device with legitimate uses should not be penalized because some people may use it to infringe on copyright
  - Supreme Court decided copying movies for later viewing was fair use

Significant Fair Use Cases and Precedents

- Reverse engineering: game machines
  - Sega Enterprises Ltd. v. Accolade Inc. (1992)
    - Accolade made videogames to run on Sega machines
    - Accolade needed to figure out how part of Sega's game-machine software worked
    - Accolade decompiled Sega's program (i.e., translated it from machine code to a form in which they could read and understand it) – this is *reverse engineering*
    - Sega sued.
    - Accolade won.
      - Accolade was making new games - fitting the purpose of fair use, that is, to encourage production of new creative work
      - Accolade's games might reduce the market for Sega's games, that was fair competition

SIGNIFICANT FAIR USE CASES AND PRECEDENTS

- Reverse engineering: game machines
  - Atari Games v. Nintendo (1992)
    - the court rules that making copies of a program for reverse engineering (to learn how it works so that a company can make a compatible product) was not copyright infringement
    - It is a fair "research" use
  - Sony Computer Entertainment, Inc. v. Connectix Corporation (2000)
    - Connectix copied Sony's PlayStation BIOS (the basic input–output system) and reverse engineered it to develop software that emulates the PlayStation console
    - Game players could then buy the Connectix program and play PlayStation games on their computers without buying the PlayStation console
  - Courts ruled that reverse engineering does not violate copyright if the intention is to make new creative works (video games), not copy the original work (the game systems)

SIGNIFICANT FAIR USE CASES AND PRECEDENTS

- Sharing music: the Napster case
  - Napster opened on the Web in 1999 as a service allowing users to copy songs in MP3 files from the hard disks of other users
  - 50 million users little more than a year later
  - 100 million MP3 files were available on the service
  - 75% of college students surveyed by Webnoize used Napster
  - Metallica filed suit against Napster – followed by A&M
  - Eighteen record companies sued for copyright infringement and asked for thousands of dollars in damages for each song traded on Napster
  - The record companies won.

SIGNIFICANT FAIR USE CASES AND PRECEDENTS

- Sharing music: the Napster case
  - Napster's arguments for fair use
    - The Sony decision allowed for entertainment use to be considered fair use
    - People make copies for personal, not commercial, use
    - Did not hurt industry sales because users sampled the music on Napster and bought the CD if they liked it
    - It was the same as a search engine, which is protected under the DMCA
    - They did not store any of the MP3 files
    - Their technology had substantial legitimate uses

Significant Fair Use Cases and Precedents

- Sharing music: the Napster case (cont.)
  - RIAA's (Recording Industry Association of America) arguments against fair use
    - "Personal" meant very limited use, not trading with thousands of strangers
    - Songs and music are creative works and users were copying whole songs
    - Claimed Napster severely hurt sales
      - The record companies showed that the sales of singles were down 46% in 2000
    - Companies are required to make an effort to prevent copyright violations and Napster did not take sufficient steps
    - Napster was not a device or new technology and the RIAA was not seeking to ban the technology

SIGNIFICANT FAIR USE CASES AND PRECEDENTS

- Sharing music: the Napster case (cont.)
  - Court ruled Napster liable in 2001 because they had the right and ability to supervise the system, including copyright infringing activities
  - Court ruled sharing music via copied MP3 files violated copyright
  - Napster faced civil suits that could have required payments of billions of dollars in damages.
    - After some ineffective attempts to remove unauthorized songs from its song lists, Napster shut down

Significant Fair Use Cases and Precedents

- Sharing music: the Napster case (cont.)
  - *Was Napster responsible for the actions of its users?*

SIGNIFICANT FAIR USE CASES AND PRECEDENTS

- File sharing: MGM v. Grokster
  - Grokster, Gnutella, Morpheus, Kazaa, and others provided peer-to-peer (P2P) file sharing services
    - The companies did not provide a central service or lists of songs
    - P2P file transfer programs have legitimate uses
  - Lower Courts ruled that P2P does have legitimate uses
  - Supreme Court ruled that intellectual property owners could sue the companies for encouraging copyright infringement
  - Businesses that encourage or provide tools for copyright infringement cannot operate legally in the United States

Significant Fair Use Cases and Precedents

Discussion Question

- *What do you think the impact would be on creative industries, such as music, movies and fiction novels, if copyright laws did not protect intellectual property?*

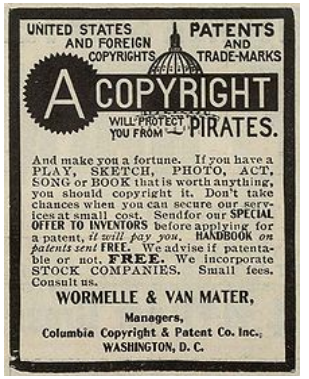
SIGNIFICANT FAIR USE CASES AND PRECEDENTS

- User and Programmer Interfaces - "Look and feel"
  - Refers to features such as pull-down menus, windows, icons, and finger movements and specific ways they are used to select or initiate actions.
  - Reflects major creative effort by programmers.
  - In the 1980s and 1990s, some companies won copyright infringement suits against others whose software had similar look and feel
  - An appeals court ruled that menu commands are "a method of operation" excluded from copyright protection

4.3 RESPONSES TO COPYRIGHT INFRINGEMENT

- Responses from the Content Industries
  - Expiration dates within the software: the software destroyed itself after that date
  - Dongles (a device that must be plugged into a computer port)
  - Copy protection that prevents copying
  - Activation or registration codes
  - Court orders to shut down Internet bulletin boards and Web sites
- Courts handed out severe penalties for organized, large-scale piracy
  - the owner of iBackup received a prison sentence of more than seven years and was ordered to pay restitution of more than $5 million after pleading guilty to illegally copying and selling software
  - a man who repeatedly recorded new movies on his camera in movie theaters and made pirate copies to sell received a sentence of seven years in jail

RESPONSES TO COPYRIGHT INFRINGEMENT



- International Piracy
  - Some countries do not recognize or protect intellectual property
  - Piracy accounts for 42% of personal computer software in use worldwide (Business Software Alliance (BSA))
  - Countries that have high piracy rates often do not have a significant software industry
    - Is easier for a consumer to find a street vendor selling a U.S. movie on DVD, book or software than to find an authorized dealer
    - The BSA calculated that the software piracy rate in China was 98% in 1994
  - Many countries that have a high amount of piracy are exporting the pirated copies to countries with strict copyright laws

RESPONSES TO COPYRIGHT INFRINGEMENT

- International Piracy
  - In China, personal computer manufacturers used to sell their machines without an operating system
    - people to bought cheap, unauthorized copies
    - In 2006, the Chinese government required that all PCs be sold with an authorized operating system preinstalled
    - The BSA reports that the software piracy rate in China dropped to 78% in 2010
  - The BSA gives a piracy rate of 20% for the United States

RESPONSES TO COPYRIGHT INFRINGEMENT

- Banning, suing and taxing
  - Ban or delay copying technology via lawsuits
    - CD-recording devices (lawsuits by a group of companies including Disney)
    - DVD players
    - Portable MP3 players
      - The Recording Industry Association of America (RIAA) sued in 1998 and obtained a restraining order to stop Diamond Multimedia Systems from shipping its Rio machine, a portable device to play MP3 music files
  - Require that new technology include copyright protections
  - Tax digital media to compensate the industry for expected losses
    - taxes on personal computers, printers, scanners, blank DVDs, recorders, iPods, and cellphones

RESPONSES TO COPYRIGHT INFRINGEMENT

- Digital Rights Management (DRM)
  - Collection of techniques that control uses of intellectual property in digital formats
    - The producer of a file has flexibility to specify what a user may do with it
    - Prevent saving, printing, making more than a specified number of copies, distributing a file, extracting excerpts, or fast-forwarding over commercials.
    - DRM enables the content seller to prevent lending, selling, renting, or giving away a purchased copy
  - Includes hardware and software schemes using encryption
  - Apple, Microsoft and Sony all use different schemes of DRM

RESPONSES TO COPYRIGHT INFRINGEMENT

The Digital Millennium Copyright Act (DMCA)

- Congress passed the DMCA in 1998
- Two important parts:
  - Anticircumvention
    - Prohibit circumventing (crack) DRM technological access controls and copy-prevention systems implemented by copyright owners in intellectual property
  - Safe harbor
    - Protect Web sites from lawsuits for copyright infringement by users of site
    - The site operators must make a good-faith attempt to keep infringing material off their sites

RESPONSES TO COPYRIGHT INFRINGEMENT

- The DMCA vs. Fair Use, Freedom of Speech, and Innovation
  - Lawsuits have been filed to ban new technologies for anticircumvention
  - U.S. courts have banned technologies such as DeCSS even though it has legitimate uses, while courts in other countries have not
    - CSS: content scrambling system is a digital rights management (DRM) and encryption system employed on many commercially produced DVD-Video discs.
    - Protesters published the code as part of creative works (in haiku, songs, short movies, a computer game and art)
  - U.S. courts eventually allowed publishing of DeCSS, but prohibited manufacturers of DVD players from including it in their products

RESPONSES TO COPYRIGHT INFRINGEMENT

- The Library of Congress decides on exemptions to the DMCA's anticircumvention provisions
- Smartphones, tablets, game machines, and other devices have mechanisms to prevent installation of software or use of services that the maker of the device does not supply or approve
  - Cracking such mechanisms is sometimes called *jailbreaking*, *unlocking*, or *rooting*
- The Library of Congress ruled in 2010 that it is legal to alter phones to install third-party software (e.g., apps) or to use an alternate service provider
  - the rule does not allow the same actions, for similar purposes, on other devices

RESPONSES TO COPYRIGHT INFRINGEMENT

- Safe Harbor
  - Industry issues "take down" notices per the DMCA
  - As long as sites like YouTube and MySpace comply with take down notices they are not in violation
    - Take down notices may violate fair use, some have been issued against small portions of video being used for educational purposes
    - Copyright owners request removal of their content (and links to their content) by sending so-called takedown notices
    - It infers costs to the copyright owners to find all videos that infringe on their copyright
  - Copyright owners argue that the sites should have the responsibility of filtering out copyright-infringing material

RESPONSES TO COPYRIGHT INFRINGEMENT

- Safe Harbor
  - Viacom sued YouTube and asked for $1 billion in damages because it found 100,000 of its videos on YouTube
    - YouTube responded that it complied with the law: it cannot always tell which are unauthorized
  - Universal Music vs. the video sharing Veoh (2011)
    - Veoh won the trial level and on appeal
    - However, Veoh declared bankruptcy; it cited the huge legal costs
  - We have better technology now: the detection and removal of infringing material is now automated

RESPONSES TO COPYRIGHT INFRINGEMENT

- Evolving Business Models
  - Organizations set up to collect and distribute royalty fees (e.g. the Copyright Clearance Center), users don't have to search out individual copyright holders
  - Apple iTunes provides legal means for obtaining inexpensive music and generate revenue for the industry and artists
  - Revenue sharing allows content-sharing sites to enable the posting of content and share their ad revenues with content owners in compensation

RESPONSES TO COPYRIGHT INFRINGEMENT

- Evolving Business Models
- Cloud storage raises copyright issues: Safe harbor in the cloud?
  - Is copying legally purchased files to and from the cloud a fair use?
  - Will the companies operating the cloud services have any responsibility for unauthorized content their customers store and share?
  - Since copyright holders do not see what is stored, they do not have the option of sending takedown notices.

RESPONSES TO COPYRIGHT INFRINGEMENT

Evolving Business Models

- What does not work
  - Zediva, a small startup in 2011, bought DVDs and rented the content (not the physical DVD) to customers legally. Court ordered Zediva to shut down.
  - Pirate Bay (Sweden, 2009): Four organizers of the Pirate Bay were convicted of contributory copyright infringement.
  - Megaupload:
    - operated from Hong Kong and New Zealand, with servers in several countries, including the Netherlands.
    - had 180 million registered users
    - claimed that it took down infringing material when notified to do so
    - The U.S. government shut Megaupload in 2012 (by legally seizing its domain names), and police in New Zealand arrested its founder and several employees

4.4 SEARCH ENGINES AND ONLINE LIBRARIES

- Search Engines
  - Copying is essential to many of the operations and services of search engines
  - Individuals and companies have sued Google for almost every search service it provides (Web text, news, books, images, and video)
  - Caching and displaying small excerpts is fair use
  - Creating and displaying thumbnail images is fair use
  - Google negotiated licensing agreements with news services to copy and display headlines, excerpts, and photos.
  - Trademarked search terms
    - Businesses pay search engine companies to display the business's ads when a user enters specific search terms
    - What if a business "buys" the name of another company?

SEARCH ENGINES AND ONLINE LIBRARIES

- Tools for authorized sharing
  - Many authors and artists are willing to share samples of their work on the Web
  - Creative Commons, a nonprofit organization, developed a spectrum of licensing agreements similar to the GNU General Public License for software
    - they provide a large degree of flexibility
  - Flickr is one of the largest users of Creative Commons licensing
    - Anyone who stores photos on Flickr can indicate what uses he or she permits

SEARCH ENGINES AND ONLINE LIBRARIES

- Books Online
  - Project Guttenberg digitizes books in the public domain in the 1970s
    - Volunteers typed the entire text of the books

  - Microsoft scanned millions of public domain books in University of California's library
  - Google has scanned millions of books that are in the public domain and that are not; they display only excerpts from those still copyrighted
  - Some court rulings favor search engines and information access; some favor content producers

SEARCH ENGINES AND ONLINE LIBRARIES

- The Authors Guide et al. vs Google (filed in 2005, resolved in 2016)
  - Judge Denny Chin ruled Google's Library Project was a fair use
    - He argued, Google's project transformed the books into something new and very valuable to society (first fair use criteria)
    - A powerful tool for accessing information, help researchers and readers finding relevant books
    - Scanning preserves old and fragile books
    - Google does not sell copies of the books or snippets, and it does not display ads on Web pages about books it did not have permission to copy
    - Google employs to prevent users from collecting enough snippets to create a copy of the book (fourth fair use criteria)
    - They help people find books and lists places from where they can buy those books
    - So Google Book no doubt increase sales
  - The Authors Guide argued transformative use previously meant ne creative material and Google's copying books was an unprecedented expansion of fair use

4.5 FREE SOFTWARE

- What is free software?
  - *Free software* is an idea advocated and supported by a large, loose-knit group of computer programmers who allow people to copy, use, and modify their software
  - *Open source* - software distributed or made public in source code (readable and modifiable)
    - *Commercial software*, often called *proprietary software*, is normally sold in object code, the code run by the computer, but not intelligible to people.
      - The source code is kept secret.
  - Richard Stallman is the best-known founder and advocate of the free software movement.
    - Stallman began the GNU project in the 1970s

FREE SOFTWARE

- GNU project
  - Began with a UNIX-like operating system, a sophisticated text editor, and many compilers and utilities
  - Now has hundreds of programs freely available and thousands of software packages available as free software (with modifiable source code)
  - Advantages:
    - More people can use and benefit from a program
    - With source code available, any of thousands of programmers can find and fix bugs
  - Developed the concept of *copyleft*
    - A developer copyrights the program and releases it under a *copyleft* agreement that allows people to use, modify, and distribute it, or any program developed from it, but only if they apply the same agreement to the new work
    - GNU General Public License (GPL) implements copyleft

FREE SOFTWARE

- Linus Torvalds wrote the Linux kernel in 1991
- Major companies began to appreciate the benefits of open source
  - IBM, Oracle, HewlettPackard, and Silicon Graphics, used, supported, and marketed Linux
  - Shell and Home Depot adopted Linux
  - Dell sold PCs with Linux installed
- Other free software:
  - Firefox Web browser
  - Apache Web server
  - MySQL database server
  - Android OS (Linux based)

FREE SOFTWARE

- Disadvantages:
  - There is no technical support number to call for help
  - Because anyone can modify free software, there are many versions and few standards, creating a difficult and confusing environment for nontechnical consumers and businesses
  - Many businesses want to deal with a specific vendor from whom they can request enhancements and assistance
- Some of these weaknesses are fading now:
  - New businesses developed to support and enhance free software: Red Hat, Ubuntu, Oracle

redhat.

ubuntu

FREE SOFTWARE

- Should all software be free?
  - Would there be sufficient incentives to produce the huge quantity of consumer software available now?
  - Would the current funding methods for free software be sufficient to support all software development?
    - How are free software developers paid?
    - Government grants to universities as a way of funding software
  - Concepts such as copyleft and the GNU Public License provide alternatives to proprietary software within today's current legal framework

4.6 PATENTS FOR SOFTWARE INVENTIONS

"*Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.*"

—U.S. Patent Law (Title 35 U.S. Code, Section 101)

- Patent law is extremely complex
- Patents protect inventions by giving the inventor a monopoly for a specified time period.
- Laws of nature and mathematical formulas cannot be patented
- Obvious inventions or methods cannot be patented
- Google, Apple, and Microsoft paid billions of dollars to buy thousands of wireless and smartphone patents

PATENTS FOR SOFTWARE INVENTIONS

- A patent holder can build the patented device using the patented element.
- The patent holder may license others to do so for a license fee, or royalty.
- You register with the government. Can register in foreign countries. US patent is issued by USPTO
  - Registration may take more than a year
- Patents generally last for 20 years
- Types - Utility, design, chemical, software, etc.

PATENTS FOR SOFTWARE INVENTIONS

- **Manual of Patent Examining Procedure (MPEP)**

https://www.uspto.gov/web/offices/pac/mpep/

- Chapter 100 - PDF Secrecy, Access, National Security, and Foreign Filing
- Chapter 200 - PDF Types, Cross-Noting, and Status of Application
- Chapter 300 - PDF Ownership and Assignment
- Chapter 400 - PDF Representative of Applicant or Owner
- Chapter 500 - PDF Receipt and Handling of Mail and Papers
- Chapter 600 - PDF Parts, Form, and Content of Application
- Chapter 700 - PDF Examination of Applications
- Chapter 800 - PDF Restriction in Applications Filed Under 35 U.S.C. 111; Double Patenting
- Chapter 900 - PDF Prior Art, Classification, and Search
- Chapter 1000 - PDF Matters Decided by Various U.S. Patent and Trademark Office Officials
- Chapter 1100 - PDF Statutory Invention Registration (SIR); Pre-Grant Publication (PGPub) and Preissuance Submissions
- Chapter 1200 - PDF Appeal
- Chapter 1300 - PDF Allowance and Issue
- Chapter 1400 - PDF Correction of Patents
- Chapter 1500 - PDF Design Patents
- Chapter 1600 - PDF Plant Patents
- Chapter 1700 - PDF Miscellaneous
- Chapter 1800 - PDF Patent Cooperation Treaty
- Chapter 1900 - PDF Protest
- Chapter 2000 - PDF Duty of Disclosure
- Chapter 2100 - PDF Patentability
- Chapter 2200 - PDF Citation of Prior Art and Ex Parte Reexamination of Patents
- Chapter 2300 - PDF Interference Proceedings
- Chapter 2400 - PDF Biotechnology
- Chapter 2500 - PDF Maintenance Fees
- Chapter 2600 - PDF Optional Inter Partes Reexamination
- Chapter 2700 - PDF Patent Terms and Extensions
- Chapter 2800 - PDF Supplemental Examination
- Chapter 2900 - PDF International Design Applications

PATENTS FOR SOFTWARE INVENTIONS

- Companies do not buy the patents because they need them for products they are developing
  - Companies buy patents so that they can sue other companies for patent infringement when the other companies sue them for patent infringement
  - A consortium including Apple, EMC, Ericsson, Microsoft, Research In Motion, and Sony paid $4.5 billion for the Nortel 6,000 patents and patent applications encompassing technologies such as wireless, wireless 4G, data networking, optical, voice, Internet, and semiconductors

PATENTS FOR SOFTWARE INVENTIONS

- In 1968, the Patent Office declared computer programs not patentable
- In 1981, the Supreme Court said that while software itself is not patentable because it is abstract, a machine or process that includes software, and in which the sole new aspect is the innovation implemented in the software, could be eligible for a patent
- In the following decades, the Patent Office issued thousands of patents, and the Federal Circuit court (which handles patent appeals) approved many
- Patents now cover encryption algorithms, data-compression algorithms, one-click shopping and other e-commerce techniques, copy-protection schemes, news feeds, location-based services for smartphones, delivery of email to cellphones

PATENTS FOR SOFTWARE INVENTIONS

- The Patent Office has a backlog of more than 600,000 patent applications
  - not enough patent attorneys to review the patents and determine if a new software product would violate an existing patent
  - grants an estimated 40,000 software patents each year
- In KSR v. Teleflex (2007), the Supreme Court broadened the definition of "obvious" for rejecting patents
- In Bilski v. Kappos (2010), the Supreme Court reemphasized that a patent must not give control over an abstract idea or mathematical algorithm

PATENTS FOR SOFTWARE INVENTIONS

- A few cases
  - Amazon.com generated a lot of criticism when it sued Barnesandnoble.com for violating its patent on one-click shopping
  - Paul Allen, co-founder of Microsoft,) sued several companies (Google, Facebook, Apple, eBay, Netflix, AOL, and others) for violating four early patents related to now widely used e-commerce and Web-viewing features.
    - A judge dismissed the suit in 2011.
    - The Patent Office reconsiders the patents
  - Apple won a patent case against a maker of Android phones for technology that allows a user to tap a touch screen to call a phone number that is in an email or text message
  - IBM sued Amazon for violating several of its patents on recommending books to customers based on their previous purchases
    - Amazon agreed to pay IBM a licensing fee

PATENTS FOR SOFTWARE INVENTIONS

- Patent trolls
  - Some companies accumulate thousands of technology patents but do not make any products.
  - They license the patents to others and collect fees.
  - Intellectual Ventures has an estimated 30,000 patents and collected close to $2 billion in license fees
  - If the patents themselves are legitimate (still an open question for many), this business model is not unreasonable
    - an inventor might have neither the skills for nor the desire to market a technology

PATENTS FOR SOFTWARE INVENTIONS

- To patent or not?
- In favor of software patents
  - Reward inventors for their creative work
  - Encourage inventors to disclose their inventions so others can build upon them
  - Encourage innovation
  - Encourage the large investment often required to develop innovative systems and techniques

PATENTS FOR SOFTWARE INVENTIONS

- To patent or not?
- Against software patents
  - In the current system, patents can stifle innovation, rather than encourage it.
    - The holder of the 1895 patent on an automobile sued Henry Ford
  - Many software developers come up with the same techniques independently, but patent law does not allow them to use their own invention if someone else has patented it
  - Cost of lawyers to research patents and risk of being sued discourage small companies from attempting to develop and market new innovations.
  - It is difficult to determine what is truly original and distinguish a patentable innovation from one that is not.