Copyrights

Intellectual Property and Computers

- What is “intellectual property”?
- Is it different with computers?
- Why do such differences exist?

Intellectual Property

“In general terms, intellectual property is any product of the human intellect that the law protects from unauthorized use by others. The ownership of intellectual property inherently creates a limited monopoly in the protected property.
(From https://www.law.cornell.edu/wex/intellectual_property)

Types of Intellectual Property

- Patents
- Copyrights
- Trademarks
- Trade secrets

All represent intangible items that are deemed worthy of protection

Constitutional Provisions

The Congress shall have the 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

Goals

- Ensure that only the creator of something can sell something for a certain time period
- If the creation is good enough, there should be a market for it
- The prospect of revenue would serve as an inducement for creators

Interesting Questions

- What is an “inventor”? A “discovery”?
- What is an “author”? A “writing”?
- What is a “limited time”?

The Rest of the World

- How does US law interact with the rest of the world?
- What if they define those terms differently?
- What if their time limits differ?

Copyrights

“A Copyright is a form of protection provided to the authors of ‘original works of authorship’ including literary, dramatic, musical, artistic, and certain other intellectual works, both published and unpublished. The 1976 Copyright Act generally gives the owner of copyright the exclusive right to reproduce the copyrighted work, to prepare derivative works, to distribute copies or phonorecords of the copyrighted work, to perform the copyrighted work publicly, or to display the copyrighted work publicly.”

STOPfakes.gov

What Copyright Protects

“The copyright protects the form of expression rather than the subject matter of the writing. For example, a description of a machine could be copyrighted, but this would only prevent others from copying the description; it would not prevent others from writing a description of their own or from making and using the machine. Copyrights are registered by the Library of Congress’ Copyright Office.”

USPTO web site

Getting a Copyright

- An eligible work is copyrighted as soon as it is “fixed” in tangible form
- No forms, paperwork, formal statements, etc., are necessary
- Your diaries are copyrighted. Your homework assignments are copyrighted. Your computer programs are copyrighted. Your tweets are copyrighted.
- But the song you compose while singing aloud in the shower isn’t, until you write it down or record it

Registering a Copyright

- You do not have to register your copyright
- However, you cannot sue for damages until you do
- There are advantages (such as being able to collect attorney fees) to registering soon after publication

Who Owns a Copyright?

- Generally, the creator owns it
- Copyright can be sold, given away, etc.
- Generally speaking, only the copyright owner can sell licenses or sue for infringement
- Some works can be in the *public domain*, e.g., if the copyright term has expired
- In “works for hire”, the employer owns the copyright
- (But that can be changed by agreement—CU, for example, does not claim copyright in faculty’s courses, scholarly writings, etc.)
- Works created by U.S. government employees are *never* copyrighted

Copyright Term

- Works created since 1978 are protected for 70 years after the author's death
- Works for hire last 95 years from publication or 120 years from creation, whichever is shorter
- The time limit has been extended several times in recent years

Derivative Works

- A copyright owner has the sole right to create *derivative works*
- Examples: movies made from books, or novelizations of movies
- But what a derivative work is is not always obvious
- Note: even if a work is no longer copyrighted, there may still be trademark issues

What Isn’t Copyrightable?

- Facts are not copyrightable
- Lists of facts in, say, alphabetical order are not copyrightable—phone books are one example. (Why? Insufficient creativity. Copyright protects creativity, not just hard work.)
- Titles, names, short phrases, unrecorded performances, etc., are not protected
- A listing of ingredients in a recipe is not copyrightable; if there is “substantial literary expression in the form of an explanation or directions”, it may be protectable
- But a “compilation copyright” can protect a cookbook

The Monkey Selfie

- Photographer David Slater set up a camera in a jungle in Indonesia
- A macaque monkey triggered the shutter and took a selfie
- Does Slater own the copyright? US: no, the monkey took it; UK: yes, Slater set it all up
- PETA: the monkey owns the copyright. Federal court: animals can't create copyrightable material

The Berne Convention

- An international copyright compact
- Fundamentally, gives foreign works the same protection as locally-produced works
- (Gilbert and Sullivan, among others, had problems with Americans pirating their works because their British copyright was not honored by American law.)
- Sets certain minimum standards for national copyright laws
- The US only joined in 1988

Pre-Berne Problems

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Fair Use

- Small excerpts can be taken from copyrighted works for various purposes
- Originally a judicial construct; now recognized by statute
- The law is deliberately vague—it just gives factors to consider
- Determination must be made on a case-by-case basis

Fair Use Criteria (17 USC 107)

“In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include:

1. “the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
2. “the nature of the copyrighted work;
3. “the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
4. “the effect of the use upon the potential market for or value of the copyrighted work.”

The Purpose of Fair Use

- Permit “transformative use”
- Permit quotation for scholarship, teaching,
- Permit criticism—balance First Amendment rights against copyright protection
- Note that vicious criticism that uses quotations to discourage readership of a book is still protected
- Fair use involves balancing different interests

Turnitin.com

- An anti-plagiarism service
- Students—on the orders of their instructor—submit homework assignments via the web site
- The assignment is compared against a large database of previously-submitted assignments
- New assignments are then added to the database
- Does this site infringe the students' copyright? No—A.V. v. iParadigms, 562 F.3d 630 (2009)
- Why not? Fair use

Analysis of iParadigms

1. the purpose and character of the use
   Use is transformative: detecting plagiarism, not republishing
2. the nature of the copyrighted work;
   The use by Turnitin.com doesn't rely on creative character of the homework
3. the amount and substantiality of the portion used
   All of the homework was used—but in a highly transformative way
4. the effect of the use upon the potential market
   The only market for most homework is to plagiarists. . .

Google

- Is Google's database fair use? Google Images?
- The use is highly transformative
- It isn't hurting the market, because it's only indexing things that are freely available
- Probably covered by the DMCA, too
- What about cached copies? Probably ok, according to Field v. Google, 412 F.Supp.2d 1106 (2006)
- But what about Google Books, which can show many pages?

Google Books

- The Author's Guild sued Google in 2005
- The judge rejected two proposed out-of-court settlements
- Eventually, the judge ruled strongly for Google: he found that all four factors favor fair use (954 F.Supp.2d 282, (2013))
- The Second Circuit upheld the judge's ruling for Google (804 F.3d 202, (2014))
- The Supreme Court decided not to take the case

Computer Programs and Copyright

- Computer programs posed interesting questions
- Was executing a program from disk a copyright infringement? The Supreme Court said “yes”—it was copied into RAM first. . .
- (This is no longer a problem, due to a revision of copyright law)
- What about the Internet? Copy protection?

The Digital Millenium Copyright Act

- The DMCA (1998) was intended to adapt copyright law to the computer age
- It also implements WIPO treaties in the US
- Provides “safe harbor” provisions for some activities
- Anti-circumvention clauses. . .

Safe Harbor

- General principle: passive carriers are not liable for copyright infringement
- Example: if personal web pages on an ISP site or content uploaded by users to a Web 2.0 site infringe, the site owner isn't liable, the creator is
- But—the site owner must respond to DMCA "takedown notices"
- (They must also have a listed site DMCA contact)

Takedown Notices

- A copyright owner can notify a site of infringing content
- Under the law, the site must promptly remove the allegedly-infringing material and notify the user who posted it
- If the user asserts that the infringement claim is mistaken, the content must be restored unless the claimant files suit
- (To dispute the claim, the user must provide their real name and address, i.e., must lose anonymity)

Abuses

- Copyright owners often claim too much
- They ignore fair use
- Their notices aren’t always accurate
- They don’t always do the right thing when the user responds

Prof. Wendy Seltzer vs. the NFL

- Seltzer claims that the copyright warning at the start of NFL games is improper
- She posted it to Youtube (http://www.youtube.com/watch?v=a4uC2H10uIo); the NFL sent a takedown notice
- She filed a response; they sent another takedown notice
- She blogged about it. . .

The NFL's Text

> *"This telecast is copyrighted by the NFL for the private use of our audience. Any other use of this telecast or of any pictures, descriptions, or accounts of the game without the NFL's consent, is prohibited."*

What is wrong?

What's Wrong?

- It bars fair use
- It bars "descriptions" or "accounts" of the game—but copyright protects *expression*, not underlying facts
- Seltzer's use was clearly protected: educational, criticism, non-commercial, etc.
- The NFL abused its rights under the DMCA

Digital Rights Management

- A lot of digital content (most movies, many books) is protected with a Digital Rights Management (DRM) mechanism
- Consumer rights are limited: time, number of viewings, copying, etc.
- But—verifying rights is often privacy-invasive
- Content isn't sold, it is *licensed*—which guts the "first sale doctrine"
- (First sale doctrine: once you've legitimately purchased a copy of a copyrighted work, you can lend it, sell it, etc., without consent of or compensation for the copyright owner.)
- Most DRM technologies are trivial to bypass—but that's illegal in the US

Anti-Circumvention

- “No person shall circumvent a technological measure that effectively controls access to a work protected under this title.” (17 USC 1201(a)(1)(A))
- “No person shall manufacture, import, offer to the public, provide, or otherwise traffic in any technology, product, service, device, component, or part thereof, that is primarily designed or produced for the purpose of circumventing a technological measure” (17 USC 1201(a)(2)(A))
- Lots of trouble. . .

Rights Taken Away

- The anticircumvention measure bars devices for making copies that are legal as fair use
- The “analog hole”
- Block new technologies before they even exist
- Discourages security analysis
- “Hardware makes policy”

Purpose of Copyright

“The primary objective of copyright is not to reward the labor of authors, but [t]o promote the Progress of Science and useful Arts. To this end, copyright assures authors the right to their original expression, but encourages others to build freely upon the ideas and information conveyed by a work. This result is neither unfair nor unfortunate. It is the means by which copyright advances the progress of science and art.”
Feist Publication, Inc. v. Rural Telephone Service Co., 499 U.S. 340, 349-50 (1991)
Internet Law Treatise,

The Trouble with the DMCA

- The DMCA has tilted too far towards protecting copyright owners
- The balance of rights is being ignored
- Technology is being impeded

DMCA Abuses

- The DMCA bars technology intended to circumvent controls that protect copyrighted material. It's been abused...
- Lexmark: embedded a chip in its ink cartridges to block third-party cartridge manufacturers; sued a company that worked around the chip
- Chamberlain Group sued a rival maker of garage door openers; the court called the suit an "attempt to leverage its sales into aftermarket monopolies"
- TI sent lawyer letters to individuals who cracked the RSA signing key for TI-83 firmware
- Many more...

Lexmark vs. SCC

“We should make clear that in the future companies like Lexmark cannot use the DMCA in conjunction with copyright law to create monopolies of manufactured goods for themselves just by tweaking the facts of this case. . . The crucial point is that the DMCA forbids anyone from trafficking in any technology that “is primarily designed or produced for the purpose of circumventing a technological measure that effectively controls access to a [protected] work.” 17 U.S.C. §1201(2)(A) (emphasis added). The key question is the “purpose” of the circumvention technology. The microchip in SCC’s toner cartridges is intended not to reap any benefit from the Toner Loading Program—SCC’s microchip is not designed to measure toner levels—but only for the purpose of making SCC’s competing toner cartridges work with printers manufactured by Lexmark.”

Concurring opinion, 387 F.3d 522 (2004)

Abusing the Anti-Circumvention Provisions

- Many companies are (ab)using the anti-circumvention provisions, especially to stymie competition
- General approach: have some copyrighted code that has some form of access control *to the product as a whole*; sue anyone who wants to enhance or compete with the product
- The competition does not try to *copy* the copyrighted material, but needs to deal with it to work around the anti-competition features
- Note that the DMCA explicitly permits reverse-engineering

Built-in Abuse

- The anti-circumvention provisions create new rights for content owners
- Yes, illegal copying is prevented
- Permissible copying—fair use—is also prevented

What About Security?

- What if I suspect that some DMCA-protected software contains a security hole?
- The DMCA prohibits (some forms) of analysis by outsiders
- In 2015, the Librarian of Congress granted a partial DCMA exemption for security research, including on cars
- It doesn't permit all security research, and it expires in a couple of years (though it has been renewed and expanded since then)

Copyrighting Hyperlinks

- Can a hyperlink infringe copyright? Generally not.
- Can a hyperlink to someone else's copyrighted material infringe? Perhaps—it's more of an issue in the EU
- What if the linked-to material is embedded in a web page, via an IMG tag or a frame?

Copyrighting APIs

- Google reimplemented some Java APIs (Application Program Interface) to create Android
- ☞ These APIs are necessary for standard library routines
- Oracle (which acquired the rights to Java when it bought Sun Microsystems) claimed this infringed their copyright on the Java source code and in 2010 sued Google
- It got complicated. . .

What's an API?

Here's part of an API definition from Java.

```
public class SecureRandom extends Random
...
public void setSeed(byte[] seed)
public void setSeed(long seed)
public void nextBytes(byte[] bytes)
```

(Did I infringe? Almost certainly not—fair use)

Many Trials

- 2012 A judge rules that APIs cannot be copyrighted
- 2014 The Court of Appeals thinks otherwise
- 2016 A jury rules that Google's reimplementation of these copyrighted APIs is fair use
- 2018 The Court of Appeals says otherwise
- 2021 The Supreme Court held that Google's copying was fair use, but did not rule on the copyrightability of APIs (Google v. Oracle, 141 S. Ct. 1183)

Alternatives to Copyright

- Not everyone wants to restrict access to their work
- Academics, for example, generally don’t profit and hence want maximum distribution
- Open Access publishing
- Creative Commons

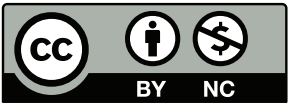
Open Access

- Many scientific papers are published by commercial firms like Springer and Elsevier
- Others are published by professional organizations like ACM and IEEE
- Most of these publishers charge for access, to make a profit or to support their work
- But—the authors do not receive royalties, and the peer review—the quality control on scientific work—is provided free by other scientists
- The research is generally government- (i.e., taxpayer-) funded
- Should these papers be freel available? More and more academics say “yes”

Sci-Hub

- Alexandra Elbakyan, a Kazakh bioengineer now living in Russia has created a web site for free access to paywalled journals
- Her code finds open library proxies at universities with site licenses—and possibly passwords shared with her; she won't say
- The publisher has accused her of stealing logins
- "I started the website because it was a great demand for such service in research community."

Creative Commons

- Creative Commons is a way to use copyright law to stipulate one of several pre-written licenses
- Attributes selectable include “no commercial use”, “attribution required”, right to share changed versions, etc.
- My slides: 

(attribution, no commercial use)
- This is a legally-binding license, imposed by the copyright owner

The GNU General Public License (GPL)

- Encourage (one view of) desirable open source (or, to some, “free”) software
- Uses *copyleft*—an actual, legally enforceable copyright with a pre-attached license
- This license imposes certain restrictions, such as mandatory source code availability
- Note: there are many other open source licenses; see `https://opensource.org/`)

File-Sharing

- Individuals obtain a digital copy of some work and distribute it
- The copyright owner is not compensated
- Does this reduce the incentives for creation?
- Or do the pirated copies represent revenue that would never have been realized in any event?
- (Often, there are unauthorized versions of works for which there is no legal version.)
- It violates copyright law as currently written.
- That is not to say that current law is correct

From the Library of Congress Web Site

“Uploading or downloading works protected by copyright without the authority of the copyright owner is an infringement of the copyright owner’s exclusive rights of reproduction and/or distribution. . .
“Whether or not a particular work is being made available under the authority of the copyright owner is a question of fact. But since any original work of authorship fixed in a tangible medium (including a computer file) is protected by federal copyright law upon creation, in the absence of clear information to the contrary, most works may be assumed to be protected by federal copyright law.
“Since the files distributed over peer-to-peer networks are primarily copyrighted works, there is a risk of liability for downloading material from these networks.”

Cost Issues

- Many different components go into the retail cost of a copyrighted item: royalties, performance (for music), editing (for books), acquisition by the publisher, marketing, physical production, distribution, retailer overhead, and more
- Digital distribution affects physical production *only*
- Electronic distribution costs much less, but servers, data centers, Internet connectivity, etc., are not free
- What has changed is the ratio between fixed costs and per-unit costs

The Underlying Issue

Era	*Creation Cost*	*Reproduction Cost*
Manuscripts	High	High
Gutenberg	High	Medium
1900	Medium-high	Medium-low
1995	Medium	Low
Now	Medium	Zero

The cost of creating a work has dropped somewhat, because of things like word processors, cheap high-quality sound equipment, etc. The cost of editing, mixing, has probably gone up. But—the cost of reproduction is close to zero. How can the fixed costs be covered?

Related Issue: Open Access Publishing

- Most academics do not profit (or expect to profit) from their writings
- Can professors post their own papers on their web pages?
- Some publishers require you to sign over copyright to them and bar postings
- Some universities (Harvard, MIT, some others) have policies requiring that articles be posted
- Several major US research funding agencies (NIH, NSF, DOE) require open access after one year
- But—how will academic publishing houses be supported?
- ☞ Do they add value?

How Peer-to-Peer File-Sharing Works

- Napster: centralized index, but the actual file transfer did not go through the central server complex
- Gnutella and many later systems create *overlay networks*; queries are flooded over the overlay, while file transfers go directly over the Internet
- This latter is far less subject to *subpoena attacks*

BitTorrent

- Files are divided into chunks
- A *tracker* can tell you which nodes have which chunks
- Different pieces of the file are downloaded from different sites
- Once a node obtains a file, it can offer it for upload
- Download speed is related to upload speed offered—prevent “leeching”

Protecting Copyright

- One approach: suing file-sharers
- But—expensive and unpopular
- New crime: criminal copyright infringement without a profit motive
- “3 strikes” laws—make ISPs responsible for disconnecting repeat infringers

The Problem with ISP Enforcement

- No due process
- People rarely have a choice of ISP
- There's a difference between downloading copyrighted material and downloading the same file without proper permission—but that doesn't show up on the wire

Felony Interference with a Business Model?

- The current structure cannot survive; it was based on technological assumptions that are no longer correct
- (You wouldn't design today's book publishing industry for a pre-Gutenberg era.)
- But—there are still fixed, medium-independent costs that need to be covered
- The challenge: devising a sustainable business model *and* overcoming vested corporate commitments to today's structure

How Should We Protect Software?

- For external distribution, copyright plus a license agreement seems to be the standard
- Patents can sometimes be useful (albeit controversial), but only if there's a clear case for novelty and non-obviousness
- ☞ Note that you need some probable way of knowing if infringement is taking place
- Internal software is always copyrighted. It *may* be a trade secret, but that might hurt internal access to source code
- Requiring employees to sign NDAs is a good idea regardless
- Check with your lawyer!

Questions?

(Snow goose, Central Park, March 24, 2019)