1. Introduction

Intellectual property protection laws were invented to ensure that creative people would get credit for their creative endeavors. There are a number of ways in which intellectual property can be protected including patents, copyright, trade marks, service marks, and trade secrets. I’ll have a particular emphasis on patent and copyright laws, as well as on related protections like copyleft and the GPL.

In many ways computer programs didn’t fit into the classic form for copyright and patent protection, and the courts over the last 40 years or so have made decisions that are sometimes confusing and often contradictory. However things appear to be, at this point, pretty stable in the courts.

2. A Few Examples

Example 1

Textbook authors will put many hundreds of hours into developing and writing a text. Writing a book is a long, and at times frustrating, process. Copyright laws are intended to ensure that the author gets fair payment for the work that they put in, and so if they hear, for example, that a book that they wrote was adopted at MSU they are probably very happy. In general they will hope that everyone in the class will buy the book, and they’ll make about 10-15% off each sale. In many cases they will be disappointed, since sometimes every text sold by the MSU Bookstore is a used book, which means that they received no money from the sale. This, however, is legal and is moral since if a student
originally bought the book then the authors got their reward at that time, and the purchaser has every right to resell the book at the end of the class for subsequent resale. In some cases the morality is more questionable. For example book publishers send free copies of their new texts to university faculty to encourage them to adopt the book. Since these are unsolicited, the faculty can legally sell the free books to one of many used book dealers\(^1\) who will then resell them through university bookstores to students, and the authors never made any money off these books. In 2005 I adopted a newly published book and all of the copies in the Bookstore were used, so presumably all of the books sold at MSU were faculty freebies, and the author made no money at any time from these books.

Another thing that happens is that a number of foreign publishers, particularly in Asia, do not respect the US copyright and run off pirated copies of standard texts, which are then purchased at a fraction of the original book price, including by students in the US.

What can authors do to combat this? One thing that has happened is that textbook life spans have shrunk from an average of five years to an average of three, because after that the used book market swamps all sales. For the book that I adopted in 2005 the publisher announced that a new edition was in the works, which came out in 2006, one year after the original text. The author can also encourage his publisher to send out fewer freebies to faculty and to urge congress into getting more active in protecting US copyrights overseas.

The used book market and the overseas publishers have had positive and negative effects. On the positive side the students have bought books at prices well below the publisher’s price. On the negative side, the situation has driven up the publisher’s price, which also has the effect of driving up the used book price, and has shortened the life of textbooks. It has also led to publishers becoming less willing to send out evaluation copies to faculty, and so the faculty won’t do as good a job when selecting class texts. In addition the author has made less money, and so faculty are less willing to attempt to create new textbooks which reduces the overall quality of the texts.

**Example 2**

In October 2001 Apple released their iPod device, and in October 2002 submitted a patent to protect the interface that they used to access songs. In August 2005 this patent application was rejected by the US Patent and Trademark Office because a prior patent request for the interface had been submitted by a Microsoft employee, on behalf of his company, in May 2002, after the release of the iPod but before Jobs and others had submitted the Apple patent request. The Microsoft application was rejected in December 2004, but they amended the application in May 2005, and the PTO has indicated that they expect that Microsoft’s new application will be approved. If this happens, and Apple is unable to overturn the decision in an appeal to the Board of Patent Appeals and

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\(^1\) They come by our offices with wheelbarrows trying to buy books. I mutter about parasites and tell them that I’m not interested.
Interferences or subsequently to the federal courts, then they will have to pay a royalty to Microsoft on every iPod sale, even though all of the technology was their own. David Kaefer, director of intellectual property licensing and business development at Microsoft, said "Our policy is to allow others to license our patents so they can use our innovative methods in their products" in a press release. Their use of the phrase “our innovative products” is probably particularly annoying to Apple.

Example 3

In 1997 a company called Forgent purchased another company called Data Compression, Inc., which owned some patents for a run-length encoding system that was used by the Joint Photographic Experts Group when they developed JPEG encoding. Even though JPEG was placed in the public domain by C-Cube, in 2002 Forgent began claiming that anyone using JPEG encoding had to pay them a fee. Since then Forgent has generated over 100 million in revenue through royalty payments, and has initiated lawsuits against nearly 50 companies for patent infringement. In April, 2005, Microsoft asked the federal courts to declare that Forgent’s patent is unenforceable, in an action in collaboration with a group called PUBPAT. Forgent countersued a week later charging Microsoft with patent infringement. Technically Forgent could have claimed that the patent applies to all uses of JPEG on the Internet. In May, 2006, the Patent Office found that the prior art submitted by opponents of the patent completely anticipated the broadest claims of the patent, and so they rejected most of Forgent’s patent claims.

The Executive Director of PUBPAT, in their press release, said "The Patent Office has agreed with our conclusion that it would have never granted Forgent Networks' '672 patent had it been aware of the prior art that we uncovered and submitted to them. Making matters worse here is that this new prior art was known by those who filed the application that led to the '672 patent, but none of them told the Patent Office about it, despite their duty to do so."

Example 4

In 1979, in return for a small ownership in the company, Xerox let engineers at a new company called Apple visit their Palo Alto Research Center (Xerox PARC) to view their computer systems. In particular they saw the graphical user interface developed by Alan Kay and others. In 1984 Apple came out with a similar system with their introduction of the Mac, after hiring Kay from Xerox PARC.

In 1985 Microsoft produced Windows 1.0, which Apple claimed violated the copyright of their windowing system, but the two companies settled when IBM licensed the technology from Apple. In 1988 Microsoft released Windows 2.03 without a license,
which Apple claimed was too similar to the MAC “look and feel” and they went to court. Six years later in 1994, after intermediate court decisions, the Court of Appeals ruled that Microsoft’s interface was not “nearly identical” to the Mac interface, and so they had not violated the copyright. The court made it clear in their opinion that they didn’t want copyright protection to be overly restrictive, in order to make it easier for standards to develop and for small companies to compete and develop.

**Example 5**

On June 30, 2000, Blackboard, a leading provider of course management systems, applied for a broad patent with the title "Internet-based education support systems and methods," which appears to effectively give them ownership of all normal Internet-based e-learning systems. To the surprise of the community this patent was awarded in the US on April 28, 2005, as patent #6988138. There were 44 claims in this patent, with the abstract:

A system and methods for implementing education online by providing institutions with the means for allowing the creation of courses to be taken by students online, the courses including assignments, announcements, course materials, chat and whiteboard facilities, and the like, all of which are available to the students over a network such as the Internet. Various levels of functionality are provided through a three-tiered licensing program that suits the needs of the institution offering the program. In addition, an open platform system is provided such that anyone with access to the Internet can create, manage, and offer a course to anyone else with access to the Internet without the need for an affiliation with an institution, thus enabling the virtual classroom to extend worldwide.

The individual claims cover everything that you would expect to see in a system like Moodle, including that the instructor can assign grades that can only be seen by the student, that when students log in they are given a list of the courses that they are registered in, that a test can be built from a database of questions, etc.

On July 26, 2006, Blackboard announced that they were initiating a patent infringement lawsuit against Desire2Learn, who also had a commercial course management system. A month later WebCT agreed to a merger where their products would become part of the Blackboard systems.

The reaction to this lawsuit from the community was strong. A Wikipedia page on the history of virtual learning environments was created as a way of showing prior art that existed before the Blackboard patent was submitted, others initiated a boycott against

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2 It is usually called the ‘138 patent.
Blackboard products\(^4\), and a suit was filed against Blackboard for “deceptive business practices and knowingly and willingly misrepresenting themselves in a patent application.”

In January 2007 Desire2Learn and the Software Freedom Law Center\(^5\) filed a request to the US Patent & Trademark Office that the patent should be reconsidered, and this request was successful with USPTO saying that the filing supported “a substantial new question of patentability” for all of the 44 Blackboard claims. However it is expected to be about two years before this reconsideration is completed, and until then (and after then if SFLC and Desire2Learn lose) Blackboard holds the patent.

On February 1, 2007, Blackboard made a pledge that they would never initiate infringement suits against open source systems like Moodle or Sakai (unless they are included in a commercial wrapper) or against homegrown systems built by instructors. They also pledged that they would not sue universities who used these systems.

Blackboard has a page that discusses their side of the issue at [http://www.blackboard.com/patent/FAQ2](http://www.blackboard.com/patent/FAQ2). Desire2Learn gives their side of the issue in a blog at [http://www.desire2learn/patentinfo](http://www.desire2learn/patentinfo).

### 3. Summary of the Major Software Protections

If you write an innovative computer program, then copyrighting the code is typically very cheap and very easy. Just the fact of storing it in tangible form (e.g., on a disk) can provide considerable protection. However, say that your program implements a wonderful new algorithm for compressing images which is much better than existing methods, then even though the code is protected by copyright your new idea is not protected. To protect the new idea the most effective approach is to apply for a patent for it. Another approach is to consider the idea to be a trade secret, in which case you don’t release how the new algorithm works. This means that you will only release an executable file for your program, and you will hope that the cost of reverse engineering the binary code will make it impractical to someone else who wants to use the algorithm.

Others, as I’ll show, don’t want to use copyright or patents, but use other approaches like copyleft, freeware, shareware, or even put their software into the public domain.

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\(^4\) It is not a coincidence that I don’t use Blackboard products like WebCT in my courses.

\(^5\) Acting for Moodle, Sakai, and ATutor.
4. Other Protections – Trademarks

A trademark protects company property, not intellectual property, and so is less relevant to this discussion, although the Apple Corps vs. Apple Computer lawsuits are relevant, as is the future status of the Google trademark.

In its simplest form a trademark is just the name of the company or product, but it can also be a recognizable symbol or logo associated with a company or one of its products. For example, the three logos, below, should immediately identify the associated products to drinkers of beer or soft drinks, or to upscale car drivers.

![Bass](image1)  ![Coca-Cola](image2)  ![Jaguar](image3)

There are also other forms of trademarks like phrases (e.g., “Just do it”) and even a classification called unconventional trade marks for things that aren’t covered by the conventional trademark list, such as shapes (e.g. the Nike swoosh[6]) or sounds, but the thing that all of them share is that they are easily recognizable as being linked to a particular company or product.

The Bass red triangle logo, shown above, was the first trademark registered in Britain, in 1876.

Trademarks can be established either through usage or through registration with the US Patent and Trademark Office (or similar agencies in other countries). If established by usage the name will often be shown as Name™ and if through registration as Name®, although neither is required.

Trademarks are defended through infringement lawsuits. Trademark law allows the use of a trademarked name as long as there is an obvious distinction between the products that both companies produce. So, for example, a software company can be named Jaguar without infringing on the car company’s trademark.

A recent example which highlights the problems of determining overlap, was when Apple Corps[7], the company that produced the Beatles, sued Apple Computer[8] for

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6 An interesting piece of trivia is that the company settled on the swoosh trademark a few weeks before they chose the name Nike.
7 The subtle pun was intended.
8 Apple Computers was named by Steve Jobs to honor the Beatles, so the name overlap was intentional.
trademark infringement. In 1981 the two companies agreed after Apple Corps’ first lawsuit that both names could coexist, with Apple Computer agreeing to sell computers and to stay out of the music business, as well as paying a financial settlement. In 1991 Apple Corps sued Apple Computer again when they began sales of their MIDI computer based music synthesizer. Apple Computer settled this for $26.5 million. In 2004 Apple Corps sued again over Apple Computer’s sales of iTunes and iPods, which they announced with posters from AppleMusic. This case was decided in the British courts where, on May 8, 2006, the judge found in favor of Apple Computers. The judge said that the iTunes system “did not suggest a relevant connection with the creative work,” and so he made a distinction between the non-creative iTunes system and the creative work of the Beatles. Apple Corps appealed to the Court of Appeals, but in February 2007 there was (finally) an out of court settlement between the two companies where Apple Corps maintained ownership of the Apple name but with the agreement that they would license out the name to Apple Computer.

A complication with trademark law is that it cannot be upheld if the trademark becomes “common usage.” For example the SEC requires that publicly held US companies submit a quarterly report called the Q-10, which in addition to financial statements, etc., has to have a description of risks facing the company. On May 10, 2006, the Google Q-10 risk factors description included:

We also face risks associated with our trademarks. For example, there is a risk that the word “Google” could become so commonly used that it becomes synonymous with the word “search.” If this happens, we could lose protection for this trademark, which could result in other people using the word “Google” to refer to their own products, thus diminishing our brand.

This concern is probably increased by the appearance of the word Google or google in many dictionaries. E.g., the Oxford English Dictionary\(^9\) contains the following entry for Google:

1. **intr.** To use the Google search engine to find information on the Internet.


2. **trans.** To search for information about (a person or thing) using the Google search engine.

**2000 Re: $Emergency_Number in NYC** in *alt.sysadmin.recovery* (Usenet newsgroup) 10 Jan., I've googled some keywords, and it came up with some other.edu text. **2001 N.Y. Times** 11 Mar. III, 12/3, I met this woman last night at a party

\(^9\) Available from the MSU domains at [www.oed.com](http://www.oed.com).
and I came right home and googled her. 2005 ‘BELLE DE JOUR’ Intimate Adventures of London Call Girl 115 Obsessing over the details, including Googling his name every few hours? Too right I did.

The positive thing here for Google is that this description still refers to using the Google search engine, and still capitalizes the verb. Other dictionaries, however, have dropped the capitalizing of the G in the new verb “google.” For example Merriam-Webster has the following entry for google:

Function: transitive verb
Inflected Form(s): googled; googling IPA/ˈɡoʊgld/ -g(ɪ)ng IPA/ˈɡoʊɡlɪŋ/ -[ɪ]ng
Usage: often capitalized
Etymology: Google, trademark for a search engine
: to use the Google search engine to obtain information about (as a person) on the World Wide Web

Other companies that have faced this problem include Xerox and Kleenex.

5. Trade Secrets

Under this approach you develop methods that you don’t release to others, except under very restrictive circumstances. If your trade secret is an algorithm then you will get your programmers to sign legally binding documents saying that they will not disclose any details of the algorithm to others, including after they leave your employment. So a larger company cannot find out your secrets by hiring one of your employees for a bigger salary.

It is sometimes necessary to describe your trade secrets to others (e.g., venture capitalists who are considering investing in your company). To protect yourself here you make the outsiders sign a Non-Disclosure Agreement (always just called an NDA) that will let you describe your secrets to them and leaves them open to major lawsuits if they divulge any information. I probably sign one of these, on average, about once each year, when a company wants to discuss possible joint developments with our department.

Obviously some things can’t be a trade secret. Consider the iPod user interface discussed earlier; since anyone using the iPod uses the interface its operation clearly isn’t a secret. To protect something like this a patent is the only option.

When they are applicable, trade secrets are usually much easier (and considerably cheaper) than patents. They cannot, however, provide the same level of protection as patents, in particular against someone reverse engineering the code or against an employee breaking their contract or someone breaking an NDA. In the last two cases you can, however, sue for damages and/or breach of contract.
6. Copyright

Having a copyright can mean one of two things; either that it is registered with the US Copyright Office (or a similar office in a different country) or that it is protected under the copyright laws. Both approaches are very cheap and easy.

When I typed in these notes I saved them on disk, which put them in tangible form. As a result, they are automatically copyright protected, as long as they are novel. I put the © symbol on the cover page, but that is mainly for show and to intimidate someone who doesn’t know copyright law. Even without it these notes are protected by copyright.

If I want to more formally register that I have a copyright of a document, which will then be available for public search, I can register my copyright with the US Copyright Office, which is part of the Library of Congress. This is surprisingly cheap and easy, as it just takes a simple form and a $30 fee. When compared to getting a patent this is incredibly cheap.

Copyright is intended to protect “original works of authorship.” The Copyright Office defines the following as being eligible for copyright protection (whether or not they are registered with the Office).

Copyright protects "original works of authorship" that are fixed in a tangible form of expression. The fixation need not be directly perceptible so long as it may be communicated with the aid of a machine or device. Copyrightable works include the following categories:

1. literary works;
2. musical works, including any accompanying words
3. dramatic works, including any accompanying music
4. pantomimes and choreographic works
5. pictorial, graphic, and sculptural works
6. motion pictures and other audiovisual works
7. sound recordings
8. architectural works

These categories should be viewed broadly. For example, computer programs and most "compilations" may be registered as "literary works"; maps and architectural plans may be registered as "pictorial, graphic, and sculptural works."

Note the rather artificial way in which programs and their executables have been added with the clause at the end, without having to change their definitions to account for this.

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10 Note that this includes files stored on a computer.
new area. When attempts were first made to copyright programs there was considerable
debate, and very inconsistent legal rulings, on whether or not they were “works of
authorship” and whether or not they fit into one of the specified categories, but this was
resolved by determining that programs are literary works. While this might sound weird
in many cases, it is now, fortunately, fixed in law.

The Copyright Office also specifies things that cannot be copyrighted as follows:

Several categories of material are generally not eligible for federal copyright
protection. These include among others:

- Works that have not been fixed in a tangible form of expression (for example,
  choreographic works that have not been notated or recorded, or
  improvisational speeches or performances that have not been written or
  recorded)
- Titles, names, short phrases, and slogans; familiar symbols or designs; mere
  variations of typographic ornamentation, lettering, or coloring; mere listings
  of ingredients or contents
- Ideas, procedures, methods, systems, processes, concepts, principles,
  discoveries, or devices, as distinguished from a description, explanation, or
  illustration
- Works consisting entirely of information that is common property and
  containing no original authorship (for example: standard calendars, height and
  weight charts, tape measures and rulers, and lists or tables taken from public
  documents or other common sources)

Note that if I have a program that includes, say, a sort routine from a commonly available
source, then my program is copyrightable, in its entirety, since it does not consist entirely
of the commonly available code.

The question of who owns any copyrighted code that you have developed is often
complex, and I’ll discuss that later in these notes.

As a final comment, even though it is cheap and easy, most copyrighted material is not
registered with the Copyright Office. The main exception is that all books and journals
are usually copyrighted by their publishers, who are also required to provide copies of the
newly copyrighted works for the Library of Congress. For example, if you search for
Starkey, J. Denbigh on the Copyright Office/Library of Congress search engine you will
find 12 entries. This surprised me because I’ve only written four books and so I expected
four entries, but the items located in the Library of Congress include different versions of
the texts along with instructor’s guides, transparency masters, etc. There are no entries for
my journal articles because it is the journals that are copyrighted and placed there, not the
individual papers in the journals.

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11 http://www.copyright.gov/records/cohm.html
Assuming that you have now, through one of the methods, copyrighted some software of a document, what does this do for you? Basically it says that nobody else can make a copy of your code or document unless they get your permission, which is why, for example, you will often see the phrase “Reprinted with Permission” on diagrams that are reused in texts. There is an exception for “fair use” which I’ll discuss below, and copyright protection does not last forever.

Under the easiest situation, if one or more programmers establish copyright on, say, a program, then the copyright protection will continue for 70 years after the death of the last of the owners. Things get a bit more complicated if the copyright was established before 1978, when the law changed, or if the work was done under a contract for hire, in which case the protection will usually be for 95 years after publication. There are some additional rules for special cases, which are clearly described by the Copyright Office at http://www.copyright.gov/circs/circ1.html#hlc.

The biggest complication with copyright law comes when I want to make a copy under the “fair use” doctrine. The Copyright Office says that:

The 1961 Report of the Register of Copyrights on the General Revision of the U.S. Copyright Law cites examples of activities that courts have regarded as fair use: “quotation of excerpts in a review or criticism for purposes of illustration or comment; quotation of short passages in a scholarly or technical work, for illustration or clarification of the author’s observations; use in a parody of some of the content of the work parodied; summary of an address or article, with brief quotations, in a news report; reproduction by a library of a portion of a work to replace part of a damaged copy; reproduction by a teacher or student of a small part of a work to illustrate a lesson; reproduction of a work in legislative or judicial proceedings or reports; incidental and fortuitous reproduction, in a newsreel or broadcast, of a work located in the scene of an event being reported.”

They also give four guidelines to help determine whether or not other uses are legal under the fair use doctrine:

1. the purpose and character of the use, including whether such use is of commercial nature or is for nonprofit educational purposes;
2. the nature of the copyrighted work;
3. 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.

So as faculty and students we have more flexibility than many other people in our ability to use small portions of, say, books, under guideline 1. However there are some significant limitations here on what even we can do. E.g., say that I am teaching a course on systems, and I don’t like the description in the text that I am using on RAID disk technologies. If another text that I own has a great section on this, can I copy those pages
and distribute them to my class? The answer is probably no since although it will be approved under guidelines 1 and 2 it probably fails the amount and substantiality guideline, and almost certainly fails guideline 4, because now nobody needs to buy that book. The safest advice is to always play safe and get explicit permission before using copyrighted works except under circumstances that clearly fit the fair use rules. An important thing to note is that just quoting the source of copyrighted materials doesn’t let you use them; you must obtain permission when they don’t fit under the fair use doctrine.

7. Patents

Whereas a copyright protects an “original work of authorship” it does not protect ideas or inventions that are described in the work. To do this, you need a patent, and for that you need a patent lawyer. Most patents are so expensive, particularly if international patent protection is sought, that they can rarely be afforded by individuals. Usually they will be sponsored by special programs in the company (or a similar organization like a university) which employs the patent seeker. Or for new independent companies they usually require venture capital (VC) support.

As an example, my wife is helping to create a new company that will hopefully develop cancer treatments using photodynamic therapy. The cost of getting US and international patents to protect their critical technology came close to $200,000, which almost made it impossible for the company to survive this paperwork. Without patent protection, however, they would have been unable to get the VC support that they needed to develop their processes.

In the US patent applications are processed by the United States Patent and Trademark Office (USPTO), which obviously also maintains trademarks. If you want to protect your new idea with them then the actual fee is only about $300\textsuperscript{12}, but that hides most of the real costs. Since you are claiming that your invention or idea is new you must review all “prior art” in the area to justify your claim, and must also describe your new idea as broadly as you think that you can get away with so that it bars anyone else from patenting something similar. Of course if you try to be too broad then the application should be rejected. Writing the applications to do this in effect requires the use of a patent lawyer, and since this is a legal specialty they cost more than most other lawyers. An additional complication is that you are still not protected worldwide. You still need to apply for patents in other areas like Europe, Japan, and any other countries or regions who might try to take your idea.

A patent for an invention is a grant of property rights by the U.S. Government through the USPTO. The patent grant excludes others from making, using, or selling the invention in the United States. Patents come with a much shorter effective time than copyrights, which outlive the author. With a patent the protection is only good for between 14 and 20

\textsuperscript{12}This varies a lot based on the kind of patent application, and on the size of the company submitting the patent, but $300 is the most common.
years, depending on the patent type and the filing process. You’ll see this with new prescription drugs, which typically are relatively expensive to cover the drug company’s development and approval costs. Then after a few years generic drugs become available which are usually considerably cheaper. What has happened is that the patent has expired, making it possible for others to produce the drug. So once a patent has been applied for it is important for companies to make their profits from the invention over the next 15 years or so, because after that they will be in competition with others who can now copy the invention. With algorithms this usually isn’t very important because after 15 years most great ideas have been replaced with even better ideas.

8. Ownership of Copyrights and Patents

Once a copyright or patent is established the next question is who owns it. With a patent this is usually obvious because all owners of the patent must be specified on the patent application. Since nearly all realistic patent applications will go through a patent lawyer, he or she will set up contracts describing exactly how the patent revenues will be distributed between the patent owners. E.g., it is not uncommon at universities for faculty seeking patents to allocate a small amount of future revenues to students working on developing the project to encourage them to work harder and longer for no additional pay. Maybe they will get nothing, or maybe they will make a lot of money, depending on how the project works out.

Copyright can be more complicated. If someone writes some software, while otherwise unemployed, then they will own the copyright on the software. If they are employed then things can be more difficult. With most companies the result will be specified in the employment contract. E.g., it might just state that copyrights will revert to the company for anything that you developed as part of your normal job for which you are paid (this is automatic since it is in the copyright law under the phrase “work for hire”). Or the employment contract might say that copyrights on anything related to your job will be owned by the company. So, for example, if you are a database programmer but on nights and weekends you develop a killer computer game then the company might claim that this is programming, and your job title is programmer, so they own the game. This can lead to lawsuits.

As an example of how inconsistent the rules can be, consider MSU. If a faculty member wants to develop a patent then they must first go to Montana Hall and discuss it. If MSU wants to be involved in the patent then they will pay for all applications, but they will also keep 50% of all revenues from the patent after first subtracting the costs of doing the patent request. An early success was with taxol. This compound, extracted in tiny amounts from large quantities of the bark of the pacific yew tree, showed enormous promise as an anti-cancer drug and the industry was valued in the billions. The biggest problem was that extracting it required a lot of yew trees, and to get enough for the potential use would have denuded the northwest of yew trees. An MSU scientist, Gary
Strobel\textsuperscript{13}, developed a laboratory process to produce taxol from a yew tree fungus, which was worth millions. After successfully patenting this process MSU became much more serious about pursuing other patents. On the other hand they treat copyrights completely differently. Copyrights are owned by the MSU employees who develop the art, and MSU has no claim on them. In 1997 a committee proposed that copyrights should be considered like patents, and that MSU should get 50\% of the revenues, but this was shot down by Mike Malone, MSU President at the time, who was a prolific author.

9. Free Software Foundation (FSF) and Copyleft

The FSF page, \url{www.fsf.org}, states that “The Free Software Foundation (FSF), established in 1985, is dedicated to promoting computer users' rights to use, study, copy, modify, and redistribute computer programs. The FSF promotes the development and use of free software, particularly the GNU operating system, used widely in its GNU/Linux variant. The FSF also helps to spread awareness of the ethical and political issues surrounding freedom in the use of software.”

The FSF led to not only the very successful GNU project but also to a number of philosophical discussions and papers on what it means for software to be free, and on successful non-commercial models for producing quality software.

They say that

“‘Free software’ is a matter of liberty, not price. To understand the concept, you should think of ‘free’ as in ‘free speech,’ not as in ‘free beer.’”

They explain this further with:

Free software is a matter of the users' freedom to run, copy, distribute, study, change and improve the software. More precisely, it refers to four kinds of freedom, for the users of the software:

- The freedom to run the program, for any purpose (freedom 0).
- The freedom to study how the program works, and adapt it to your needs (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help your neighbor (freedom 2).

\textsuperscript{13} He’s an interesting guy. For a description see \textit{Biologist Gets Under the Skin of Plants--And Peers}, including the taxol story and the Dutch elm controversy from \textit{Science} at \url{http://www.sciencemag.org/cgi/content/full/296/5573/1597}. 
• The freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this.

A program is free software if users have all of these freedoms. A more comprehensive discussion of what the FSF means by this idea is at http://www.fsf.org/licensing/essays/free-sw.html.

The FSF protects their software freedom with copyleft, which as the name implies is supposed to be the opposite in some ways of copyright. The GNU General Public License (GPL), first developed by Richard M. Stallman, is still the classic example of copyleft. Basically it says that anyone can use their code without charge, and can modify the code for their own use, but if they add to the code they can only distribute it under the GPL rules – i.e., it must be free and carry the same constraints for future developers. Stallman believes that if copyright has been used to protect and commercialize code then copyleft is needed to ensure that other code will always be free. The full text of the GPL is at http://www.gnu.org/copyleft/gpl.html.

The classic example of software that was distributed free because of the GPL is the GNU C++ compiler, which was built by a commercial consortium (the MCC) as an extension to the GNU C compiler. Since they were extending the copylefted compiler gcc they had no choice but to also put their C++ compiler under the GPL, and so they included it in the free GNU distribution.

The biggest and most important example of software that has been developed under the GPL is the Linux Operating System. This also highlights an important feature of GPL software – although the software and all extensions to Linux must be freely available to anyone who wants them, it is still permissible for companies to package and sell the software and to sell warranties and support for the software. So there are now many ways to get installable versions of Linux including Debian, which is supported by volunteers and is free, and Red Hat, which isn’t, but has a warranty and ongoing support and training available for a cost.

There have been upgrades to GPL, with the newest version currently under consideration being called GPLv3. This is, however, receiving opposition now that it is in the public comment stage, including from Linus Torvalds, the originator of the Linux development project. See http://news.com.com/Torvalds+critical+of+new/GPL+draft/2100-7344_3-6099475.html for a discussion of this debate.

10. Freeware, Shareware, and Public Domain Software

In addition to traditional commercial software or copylefted software, software can also be distributed using other systems, most of which can be described as freeware, shareware, or public domain software.
Software protected by the GPL copyleft is sometimes described as freeware, and sometimes as public domain software, but both of these are incorrect.

With freeware the author of the software freely distributes the software for certain uses but retains a copyright to restrict the user to those uses. E.g., most freeware does not allow the user to modify the code and release the extended or modified code into the community, whereas GPL protected code explicitly encourages this, as long as the new system is still protected by the GPL copyleft.

With shareware authors want to get payment for the software, but they don’t want all of the hassles of setting up a commercial site and selling it. So they distribute the software without any charge, but with a request that if the user finds that the software is useful (or fun, or whatever) then they will voluntarily send in a payment, which is usually fairly small. Usually those who register and send in a payment for shareware will be eligible for updates, fixes, and other support. Shareware is copyrighted.

Public domain software is software where the authors have explicitly released all copyright claims. Since there is no copyright involved users can modify the code and sell their program without any restrictions.

11. Creative Commons

Creative Commons (http://creativecommons.org) was founded as a nonprofit in 2001 by Stanford Law professor Lawrence Lessig. In his book Free Culture he describes a motivating philosophy: "There has never been a time in history when more of our "culture" was as "owned" as it is now. And yet there has never been a time when the concentration of power to control the uses of culture has been as unquestioningly accepted as it is now." Inspired by the GPL and related copyleft approaches using copyright law nontraditionally to promote free principles, Creative Commons (CC) developed a system of related licenses for use by copyright holders to release their works while retaining only certain rights, in a modular fashion. Their slogan is “Some Rights Reserved”.

To keep these licenses usable and enforceable, they maintain a system of several representations:

- Commons Deed: a plain-language summary of the license a layperson can understand, with accompanying icons that can also be embedded in a work representing each component.
- Digital Code: machine-readable metadata to allow automated indexing or filtering of CC-licensed material.
- Legal Code: official gobbledygook making the terms legally enforceable.

Types of License
The 6 original “core” licenses form all meaningful combinations of “baseline rights” and two variable terms. The baseline rights include attribution; allowing copying, distribution, performance, and format shifting; but requiring that the license remain unaltered and that no “technology” be used to restrict others' lawful use. The baseline also makes the license irrevocable and as permanent as the copyright.

Variable is the matter of derivative works (disallowed “nd”, allowed under the same license “share alike, sa”, or without restriction) and whether use is limited to non-commercial purposes “nc”. Adding the baseline attribution “by”, the six licenses are: by-nc-nd, by-nc-sa, by-nc, by-nd, by-sa, and by.

In response to specific concerns, other licenses have been created:

- “sampling” allows copying & derivation (c&d) of pieces only, and not for advertising.
- “Sampling plus” adds whole-work c&d for noncommercial uses, while
- “noncommercial sampling plus” further restricts piece c&d to be noncommercial.
- “Music sharing” allows copying, archiving, sharing &c, but no altering or commercial use.
- “GPL” and “LGPL” were added to the system to promote these licenses and incorporate them with the Commons Deed and Digital Code representations.
- “Developing nations” allows broad use in nations the World Bank considers “developing”, while keeping restrictions in wealthier countries.
- “founders' copyright” replicates the 1790 U.S. copyright in a scheme where the copyright holder sells it to CC for $1, then licenses their work back under these terms.

The CC website keeps a list of featured works covered by their licenses; several other projects including the related Common Content (http://commoncontent.org) specifically archive or index CC materials. Some interesting ones include:

- MIT OpenCourseWare (http://ocw.mit.edu/) is licensed as “by-nc-sa”.
- The Speech Accent Archive (http://accent.gmu.edu), a collection of audio recordings of people reading an English paragraph, is also “by-nc-sa”.
- Flickr, the photo sharing site, indexes users' images by CC license at http://www.flickr.com/creativecommons.
- Magnatune (http://magnatune.com) is a music producer attempting to combine a profitable business with their somehow familiar ethic “we are not evil.” They provide 128kbit MP3 versions of their artists' music gratis and “by-nc-sa”, charging for higher-quality files, CDs, and commercial licenses.
- Genome Biology (http://genomebiology.com) is a fairly new (2000) journal of genomics and “post-genomics” offering primary papers gratis and “by” licensed.
- Several of Lessig's books are licensed “by-nc”
The first test of a CC license in court was decided on March 6, 2006, by the District Court of Amsterdam. Adam Curry had published family photos on Flickr licensed “by-nc-sa”. The Dutch gossip magazine Weekend published them, claiming it assumed “in good faith” they were public domain and claiming that the link to the license was not obvious. Curry sued for copyright and privacy infringement. The court upheld the license, finding Weekend had “assumed too easily.”

Although the original generic CC licenses aren't US-specific they are built on assumptions from an American context. There is an ongoing volunteer project to develop jurisdiction-specific Legal Code for each license (http://creativecommons.org/worldwide). This is currently complete for 33 nations. Many other countries are in-process or planned.

CC has recently given attention to the scientific domain with the Science Commons (http://sciencecommons.org/). Arguing that traditional free flow of information and modern information technology have great potential toward the scientific process, but are currently too restricted by legal and cultural barriers, this project seeks to apply the CC philosophy to improve the intersection of science and law. This includes simplifying scholarly publication and biological materials transfer licensing through the “three representation” (plain, machine, and legal language) approach, as well as investigating issues like the distribution of medicine in developing nations and sharing primary data. (See http://www.plantphysiol.org/cgi/content/full/133/1/10, http://www.nature.com/nature/journal/v438/n7068/full/438531a.html.)