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Intellectual Property

> *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

4.1 Principles, Laws, and Cases

4.1.1 What Is Intellectual Property?

Have you made a video set to a popular song and put it on the Web? Have you recorded a televised movie to watch later in the week? Have you downloaded music from the Web without paying for it? Have you watched a streaming video of a live sports event? Do you know which of these actions are legal and which are illegal, and why? Is it legal for a search engine to copy videos and books in order to display excerpts? How should intellectual property owners respond to new technologies that make it easy to copy and distribute their property without permission? How do copyright owners abuse copyright? If you are developing software for an online retail site, can you implement one-click shopping without permission of a patent holder? Will enforcement of strict notions of copyright and patent smother the creativity enabled by modern technology? We begin our exploration of these and other issues about intellectual property by explaining the concept of intellectual property and reviewing principles of intellectual property laws.

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. Patent, another legal concept that defines rights to intellectual property, protects inventions, including some software-based inventions.

In addition to copyright and patents, various laws protect other forms of intellectual property. They include trademarks and trade secrets. This chapter concentrates more on copyright than other forms of intellectual property because digital technology and the Internet affect copyright so strongly. Patent issues for software and Web technologies are quite important and controversial. We discuss them in Section 4.5.

The key to understanding intellectual property protection is to understand that the thing protected is the intangible creative work—not its particular physical form. When we buy a novel in book form, we are buying a physical collection of paper and ink. When we buy a novel as an ebook, we are buying certain rights to 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," or the "work." The owner of a physical book may give away, lend, or resell the

one physical book he or she bought but may not make copies (with some exceptions). The legal right to make copies belongs to the owner of the intangible "book"—that is, the owner of the copyright. The principle is similar for software, music, movies, and so on. The buyer of a software package is buying only a copy of it or a license to use the software. When we buy a movie on disc or via streaming video, we are buying the right to watch it, but not the right to play it in a public venue or charge a fee.

Why does intellectual property have legal protection? The value of a book or a song or a computer program is much more than the cost of printing it, putting it on disk, or uploading it to the Web. 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, labor, and other nonmaterial efforts and attributes their creators provide. Our property rights to the physical property we create or buy include the rights to use it, to prevent others from using it, and to set the (asking) price for selling it. We would be reluctant to make the effort to buy or produce physical things if anyone else could just take them away. If anyone could copy a novel, a computer program, or a movie for the small price of the copying, the creator of the work would receive very little income from the creative effort and would lose some of the incentive for producing it. Protection of intellectual property has both individual and social benefits: it protects the right of artists, authors, and inventors to compensation for what they create, and, by so doing, it encourages production of valuable, intangible, easily copied, creative work.

The author of a particular piece of intellectual property, or his or her employer (e.g., a newspaper or a software company), may hold the copyright or may transfer it to a publisher, a music recording company, a movie studio, or some other entity. Copyrights last for a limited time—for example, the lifetime of the author plus 70 years. After that, the work is in the *public domain*; anyone may freely copy and use it. Congress has extended the time period for copyright control more than a dozen times. The extensions are controversial, as they hold more material out of the public domain for a long time. For example, the movie industry lobbied for and obtained an extension of its copyright protection period from 75 years to 95 years when the first Mickey Mouse cartoon was about to enter public domain.

U.S. copyright law (Title 17 of the U.S. Code[1]) gives the copyright holder the following exclusive rights, with some very important exceptions that we will describe:

- 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 (e.g., artwork, movies, computer games, video on a website)

Restaurants, bars, shopping centers, and karaoke venues pay fees for the copyrighted music they play.* Moviemakers pay for the right to base a movie on a book, even if they make significant changes to the story.

Making a copy of a copyrighted work or a patented invention does not deprive the owner or anyone else of the work's use. Intellectual property differs from physical property in this way. Thus, taking intellectual property by copying is different from theft of physical property, and copyright law does not prohibit *all* unauthorized copying, distribution, and so on. A very important exception is the "fair use" doctrine, which we discuss in Section 4.1.4. Uses of copyrighted material that the copyright owner has not authorized and that one of the exceptions in the law does not permit are infringements of the copyright and are subject to civil and/or criminal penalties.

Most of the discussions in this chapter are within a context that accepts the legitimacy of intellectual property protection but revolve around its extent, how new technology challenges it, and how it can or should evolve. Some people reject the whole notion of intellectual property as property, and hence, copyrights and patents. They see these mechanisms as providing government-granted monopolies, violating freedom of speech, and limiting productive efforts. This issue is independent of computer technology, so we do not cover it in depth in this book. However, the discussion of free software, in Section 4.4, overlaps arguments about the legitimacy of copyright in general.

4.1.2 Challenges of New Technologies

> *Copyright law will disintegrate.*
>
> —Nicholas Negroponte[2]

> *New technologies have been disrupting existing equilibria for centuries, yet balanced solutions have been found before.*
>
> —Pamela Samuelson[3]

Previous technologies raised challenges to intellectual property protection. For example, photocopiers made copying of printed material easy. However, such earlier technologies were not nearly as serious a challenge as digital technology. A complete photocopy of a book is bulky, sometimes of lower print quality, awkward to read, and more expensive than a paperback. Computers and communications technologies made high-quality copying and high-quantity distribution extremely easy and cheap. Technological factors include the following:

* Not all do, of course, but it is the accepted, and legal, practice.

- Storage of all sorts of information (text, sound, graphics, video) in standard digitized formats; the ease of copying digitized material and the fact that each copy is a "perfect" copy
- High-volume, relatively inexpensive digital storage media, including hard disks for servers and small portable media such as DVDs, memory sticks, and flash drives
- Compression formats that make music and movie files small enough to download, copy, and store
- Search engines, which make it easy to find material, and the Web itself
- Peer-to-peer technology, which permits easy transfer of files over the Internet by large numbers of strangers without a centralized system or service; and later, file-hosting services that enable storage and sharing of large files (e.g., movies)
- Broadband (high speed) Internet connections that make transfer of huge files quick and enable streaming video
- Miniaturization of cameras and other equipment that enable audience members to record and transmit movies and sports events; and, before that, scanners, which simplify converting printed text, photos, and artwork to digitized electronic form
- Software tools for manipulating video and sound, enabling and encouraging non-professionals to create new works using the works of others

In the past, it was generally businesses (newspapers, publishers, entertainment companies) and professionals (photographers, writers) who owned copyrights, and it was generally businesses (legal and illegal) that could afford the necessary copying and production equipment to infringe copyrights. Individuals rarely had to deal with copyright law. Digital technology and the Internet empowered us all to be publishers, and thus to become copyright owners (for our blogs and photos, for example), and they empowered us all to copy, and thus to infringe copyrights.

The first category of intellectual property to face significant threats from digital media was computer software itself. Copying software used to be common practice. As one writer said, it was "once considered a standard and acceptable practice (if it were considered at all)."[4] People gave copies to friends on floppy disks, and businesses copied business software. People traded *warez* (unauthorized copies of software) on computer bulletin boards. Software publishers began using the term "software piracy" for high-volume, unauthorized copying of software. Pirated software included (and still includes) word processing programs, spreadsheet programs, operating systems, utilities, games, and just about any consumer software sold. Some, such as new versions of popular games, often appear on unauthorized sites or for sale in other countries before their official release. The software industry estimates the value of pirated software in billions of dollars.

In the early 1990s, one could find on the Internet and download unauthorized copies of popular humor columns (copied from newspapers), lyrics of popular songs, and some images (e.g., Walt Disney Company characters, Playboy pinups, and myriad Star Trek items). Music files were too large to transfer conveniently. Tools for listening to music on computers were unavailable or awkward to use; devices for recording or copying digital music were expensive. Technology improved and prices fell. (CD recorders sold for about $1000 when first introduced, and for $99 within about three years.)

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. Hundreds of MP3 sites appeared, making thousands of songs available. MP3 has no mechanism for preventing unlimited or unauthorized copying. Many songwriters, singers, and bands willingly made their music available, but most trading of MP3 files on the Net was unauthorized.

In the 2000s, more new technology (e.g., sophisticated file-sharing schemes, inexpensive video cameras, video editing tools, and video-sharing sites) enabled members of the public to provide entertainment for each other—and to post and share professional videos owned by others. Copying music and movies became easy, fast, cheap, and ubiquitous. The scope of the term "piracy" expanded to include high-volume, unauthorized copying of any form of intellectual property. It can mean individuals posting unauthorized files to legitimate file-sharing sites; underground groups trading unauthorized copies; or highly profitable, multimillion-dollar businesses (mostly outside the United States) that encourage members to upload and share files, knowing that most of the files are unauthorized copies.

The content industries claim that about one-quarter of Internet traffic worldwide consists of copyright-infringing material.[5] The entertainment industry, like the software industry, estimates that people copy, trade, and sell billions of dollars of its intellectual property without authorization each year. The dollar amounts from industry sources might be inflated,* but the amount of unauthorized copying and distribution of music, video, and other forms of intellectual property is huge. Entertainment companies and other content providers are losing significant income and potential income that they could earn from their intellectual property. As we seek solutions to this problem, though, we should recognize that "the problem" looks different from different perspectives. What does it mean to solve the problems of technology's impact on intellectual property rights? What are the problems for which we seek solutions?

To consumers, who get movies and music online, the problem is to get them cheaply and conveniently. To writers, singers, artists, actors—and to the people who work in production, marketing, and management—the problem is to ensure that they are paid for the time and effort they put in to create the intangible intellectual-property products we

* Some figures seem to assume that everyone who downloads a movie or song for free illegally would buy it at full price if it were not available for free.

enjoy. To the entertainment industry, to publishers and software companies, the problem is to protect their investment and expected, or hoped-for, revenues. To the millions who post amateur works using the works of others, the problem is to continue to create without unreasonably burdensome requirements and threats of lawsuits. To scholars and various advocates, the problem is how to protect intellectual property, but also to protect fair use, reasonable public access, and the opportunity to use new technologies to the fullest to provide new services and creative work. We explore problems and solutions from several perspectives in this chapter.

The two quotations at the beginning of this section date from 1995, when the significant threat to copyright from digital media became clear. Users and observers of digital media and of the Internet debated whether copyright would survive the enormously increased ease of copying and the habits and expectations that developed about sharing information and entertainment online. Some argued that copyright would survive, mostly because of firm enforcement of copyright law. Others said the ease of copying would win out; most content would be free or almost free. These positions seem more compatible today than they did at first. Enforcement has been fierce, but much legal content is free or cheap due to improved technology and the many services that provide free content sponsored by advertising.

4.1.3 A Bit of History

A brief history of copyright law will provide background and help illustrate how new technologies require changes or clarifications in law.[6]

The first U.S. copyright law, passed in 1790, covered books, maps, and charts. It protected them for 14 years. Congress later extended the law to cover photography, sound recordings, and movies. The definition of an unauthorized copy in the Copyright Act of 1909 specified that it had to be in a form that could be seen and read visually. Even with the technologies of the early 20th century, this requirement was a problem. A court applied it in a case about copying a song onto a perforated piano-music roll. (Automatic pianos played such rolls.) A person could not read the music visually from the piano roll, so the copy was not judged a violation of the song's copyright, even though it violated the spirit and purpose of copyright.[7] In the 1970s, a company sued for protection of its chess-playing program, implemented on a read-only-memory (ROM) chip in its handheld computer chess game. Another company sold a game with the identical program; they likely copied the ROM. But because the ROM could not be read visually, a court held that the copy did not infringe the program's copyright.[8] Again, this did not well serve the purpose of copyright. The decision did not protect the creative work of the programmers. They received no compensation from a competitor's sales of their work.

In 1976 and 1980, Congress revised copyright law to cover software. "Literary works" protected by copyright include computer databases that exhibit creativity or originality[9] and computer programs that exhibit "authorship," that is, contain original expression of

ideas. Recognizing that technology was changing rapidly, the revised law specifies that copyright applies to appropriate literary works "regardless of the nature of the material objects . . . in which they are embodied." A copy could be in violation of a copyright if the original can be "perceived, reproduced, or otherwise communicated by or from the copy, directly or indirectly."

One significant goal in the development of copyright law, illustrated by the examples above, has been devising good definitions to extend the scope of protection to new technologies. As copying technologies improved, another problem arose: a lot of people will break a law if it is easy to do so and the penalties are weak. In the 1960s, growth in illegal sales of unauthorized copies of recorded music (e.g., on tape) accompanied the growth of the music industry. In 1982, high-volume copying of records and movies became a felony. In 1992, making a small number of copies of copyrighted work "willfully and for purposes of commercial advantage or private gain" became a felony. In response to the growing phenomenon of sharing files for free on the Internet, 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. After huge growth in sales of unauthorized copies of movies, Congress made it a felony offense to record a movie in a movie theater—one of the ways copies get to those who reproduce and sell them illegally. Critics of these laws argue that the small offenses covered do not merit the severe penalties.

Why did copyright laws get more restrictive and punishing? Generally, creators and publishers of copyrighted works, including print publishers, movie companies, music publishers, sound recording companies (record labels), and the software industry support stronger copyright protection. Congress often delegates the drafting of laws in complex areas to the industries involved. For most of the 20th century, the intellectual property industries drafted laws heavily weighted toward protecting their assets. On the other side, librarians and academic and scientific organizations generally opposed strict rules reducing the public's access to information. Most people were unaware of or indifferent to copyright issues. But digital media, and especially the growth of the Web, focused attention on issues about how much control copyright owners should have. In the 1990s, cybercitizens and organizations such as the Electronic Frontier Foundation joined librarians and others to fight what they view as overly restrictive copyright law. The content industries continue to be powerful lobbyists for their point of view. Web service companies and organizations (such as Google, Facebook, and Wikipedia) add some balance to the lobbying and public debate.

4.1.4 The 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. Fair uses do not require the permission of the copyright holder. The notion of fair use (for literary and artistic works) grew from judicial decisions. In 1976, U.S. copyright law explicitly included it. It applies to software also. The 1976 copyright law predated the widespread use of personal computers. The software issues addressed pertained mainly to large business systems, and the law did not address issues related to the Web at all. Thus, it did not take into account many situations where questions of fair use now arise.

The law identifies possible fair uses, such as "criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research."[10] It lists four factors to consider in determining whether a particular use is a "fair use":

1. The purpose and nature of the use, including whether it is for commercial purposes or nonprofit educational purposes. (Commercial use is less likely to be fair use.)
2. The nature of the copyrighted work. (Use of creative work, such as a novel, is less likely than use of factual work to be fair use.)
3. The amount and significance of the portion used.
4. The effect of the use on the potential market for or value of the copyrighted work. (Uses that reduce sales of the original work are less likely to be considered fair.)

No single factor alone determines whether a particular use is a fair use, but the last one generally gets more weight than the others.

Court decisions about copyright must be consistent with the First Amendment. For example, courts interpret the fair use principle broadly to protect creation of parodies of other works. In many situations, it is not obvious whether a use is a fair use. Courts interpret and apply the guidelines in specific cases. Law scholars say that results of fair use cases are often notoriously difficult to predict. The uncertainty itself can chill free speech. Fear of an expensive legal case can reduce creation of valuable new work that makes fair use of other works.

4.1.5 Ethical Arguments About Copying

There is intrinsic "fuzziness" about the ethics of copying. Many people who get their music, movies, or software from unauthorized sources realize they get "something for nothing." They benefit from the creativity and effort of others without paying for it. To most people, that seems wrong. On the other hand, much copying does not seem wrong. We explore some of the reasons and distinctions.

Copying or distributing a song or computer program does not decrease the use and enjoyment any other person gets from his or her copy. This fundamental distinction

between intellectual property and physical property is a key reason why copying is ethical in far more circumstances than taking physical property. However, most people who create intellectual property in entertainment, software, and so on, are doing so to earn income, not for the benefit of using their product themselves. If movie theaters and websites could show, or stream, copies of movies without paying for them, far fewer people and companies would invest money, time, energy, and creative effort in making movies. If search engines could scan any book and offer free downloads without an agreement with the publisher, publishers would probably not sell enough copies to cover costs; they would stop publishing. The value of intellectual property is not just the direct use and enjoyment one gets from a copy. Its value is also as a product offered to consumers to earn money. That is an aspect of the property that one can steal from the copyright holder. When people widely copy intellectual property without permission, they diminish the value of the work as an asset to the owner. That is why a lot of copying is wrong.

Supporters of unauthorized file-sharing services and people who advocate loose restrictions on copying intellectual property argue that permitting copying for, say, trying out a song or computer program before buying it benefits the copyright owner because it encourages sales. Such uses seem ethical, and indeed, since a lot of the "wrong" in unauthorized copying stems from depriving owners of income from their product, the fourth of the fair use guidelines considers the impact on the market for the product. However, we should be careful not to go too far in usurping a copyright holder's decisions. Many businesses give free samples and low-priced introductory offers to encourage sales, but that is a business decision. The investors and employees of the business take the risk for such choices. A business normally makes its own decisions about how it markets its product, not consumers who want free samples, nor even the courts.

People who copy for personal use or distribute works of others without charge usually do not profit financially. Personal use is, reasonably, more likely to be fair use (both ethically and legally) than is commercial use, but is personal use always fair? Is financial gain always relevant? In some contexts, a profit motive, or financial gain, is a factor in concluding that an activity is wrong. In other contexts, it 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. A profit motive is not a significant factor in determining where to protect freedom of speech. Freedom of speech is an important social, ethical, and legal principle for book, magazine, newspaper, and website publishers, most of whom are in business to make a profit. Many kinds of abusive or threatening speech are unrelated to financial gain but are unethical.

Here are some arguments people make in support of personal copying or posting content on the Web without authorization (in situations that are not clearly fair use) and some counterpoints to consider. The responses below do not mean that unauthorized copying or use of someone else's work is always wrong—in many cases it is not. These are brief suggestions for analyzing the arguments.

- *I cannot afford to buy the software or movie or pay the royalty for use of a song in my video.* There are many things we cannot afford. Not being able to afford something does not justify taking it.
- *The company is a large, wealthy corporation.* The size and success of the company do not justify taking from it. Programmers, writers, and performing artists lose income too when copying is common.
- *I wouldn't buy it at the retail price (or pay the required fee) anyway. The company is not really losing a sale or losing revenue.* The person is taking something of value without paying for it, even if the value to that person is less than the price the copyright owner would charge. There are times when we get things of value without paying. Our neighborhood looks better when our neighbors paint their houses. People do us favors. It can be easy to ignore a crucial distinction: Who makes the decision?
- *Making a copy for a friend is just an act of generosity.* Philosopher Helen Nissenbaum argued that someone who copies software for a friend has a countervailing claim against the programmer's right to prohibit making the copy: the "freedom to pursue the virtue of generosity."[11] Surely we have a liberty (i.e., a negative right) to be generous, and we can exercise it by making or buying a gift for a friend. It is less clear that we have a claim right (a positive right) to be generous. Is copying the software an act of generosity on our part or an act that compels involuntary generosity from the copyright owner?
- *This violation is insignificant compared to the billions of dollars lost to piracy by dishonest people making big profits.* Yes, large-scale commercial piracy is worse. That does not imply that individual copying is ethical. And, if the practice is widespread, the losses become significant.
- *Everyone does it. You would be foolish not to.* The number of people doing something does not determine whether it is right. A large number of people in one peer group could share similar incentives and experience (or lack thereof) that affect their point of view.
- *I want to use a song or video clip in my video, but I have no idea how to get permission.* This is a better argument than many others. Technology has outrun the business mechanisms for easily making agreements. The "transaction costs," as economists call them, are so high that a strict requirement for obtaining permission slows development and distribution of new intellectual property.
- *I'm posting this video (or segment of a TV program) as a public service.* If the public service is entertainment (a gift to the public), the observations above about copying as a form of generosity are relevant here. If the public service is to express an idea or make some statement about an important issue, the posting might be analogous to creating a review or a parody. In some cases, these might be reasonable fair uses

with social value. Simply posting a complete program, or a substantial portion of one, is probably not a fair use.

Laws are not always good guides for ethical decisions, but the fair use guidelines do a respectable job of identifying criteria to help distinguish fair and unfair copying. Because of the complexity of the issues, there will always be uncertainty in the application of the guidelines, both ethically and legally. The guidelines might need expansion and clarification to cover new media, but they give us a good framework that corresponds to sensible ethical criteria.

4.1.6 Significant Legal Cases

The fair use doctrine is important for different contexts. First, it helps us figure out under what circumstances we as consumers can legally copy music, movies, software, and so on. Second, developers of new software, recording devices, game players, and other products often must copy some or all of another company's software as part of the process of developing the new product. The new product might compete with the other company's product. Is such copying a fair use? We look at cases that cover these contexts. Some of the cases also involve the degree of legal responsibility a company has for copyright violations by users of its products or services. This point is important for many Web-based services, some that implicitly or explicitly encourage unauthorized uses of the works of others.

Sony vs. Universal City Studios (1984)

The Sony case was the first case about private, noncommercial copying of copyrighted work that the Supreme Court decided.[12] It concerns videotape recording machines, but it is cited in Web-based entertainment cases and in cases about new kinds of digital recording devices.

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. Thus, this case raised the important issue of whether copyright owners can sue makers of copying equipment because some buyers use the equipment to infringe copyrights. First, we focus on the other issue the Supreme Court decided in the Sony case: whether recording a movie for personal use was a copyright infringement or a fair use. People copied the entire movie. Movies are creative, not factual, works. Thus, factors (2) and (3) of the fair use guidelines argue against the taping. The purpose of recording the movie was to view it at a later time. Normally the consumer reused the tape after viewing the movie, making it an "ephemeral copy." The copy was for a private, noncommercial purpose, and the movie studios could not demonstrate that they suffered any harm. The Court interpreted factor (2), the nature of the copyrighted work, to include not simply whether it was creative or factual, but also the fact that the studios

receive a large fee for broadcasting movies on television, and the fee depends on having a large audience of people who view the movies for free. So factors (1), (2), and (4) argue for fair use. The Court ruled that recording a movie for viewing at a later time was a fair use.

The fact that people copied the entire work did not necessitate a ruling against fair use, although many examples of fair use apply only to small excerpts. The fact that the copying was a private, noncommercial use was significant. The Court said that private, noncommercial uses should be presumed fair unless there is realistic likelihood of economic harm to the copyright holder.

On the issue of the legitimacy of the Betamax machine, the Court said makers of a device with substantial legal uses should not be penalized because some people use it to infringe copyright. This is a very important principle.

Reverse engineering: game machines

In the Sony case, the Supreme Court's decision said that noncommercial copying of an entire movie can be fair use. In several cases involving game machines, the courts ruled that copying an entire computer program for a *commercial* use was fair, largely because the purpose was to create a new product, not to sell copies of another company's product. The first case is *Sega Enterprises, Ltd. v. Accolade, Inc.* Accolade made videogames to run on Sega machines. To make their games run properly, Accolade needed to figure out how part of Sega's game-machine software worked. Accolade copied Sega's program and decompiled it (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. The court viewed Accolade's activities as fitting the purpose of fair use—that is, to encourage production of new creative work. The fact that Accolade was a commercial entity was not critical. Although Accolade's games might reduce the market for Sega's games, that was fair competition. Accolade was not selling copies of Sega's games.[13] In *Atari Games v. Nintendo*, the court also ruled 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.

The court applied similar arguments in deciding in favor of Connectix Corporation in a suit by Sony Computer Entertainment, Inc. 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. Connectix's program did not contain any of Sony's code, and it was a new product, different from the PlayStation console. The copying of the BIOS was fair use.[14]

These decisions show how courts interpret fair use for situations not imagined when the guidelines were written. Reverse engineering is an essential process for creating new products that must interact with other companies' hardware and software.

Sharing music: the Napster case

> *When Big Steel and the auto industry were under pressure during the '70s from low-cost imports, their first instinct was not to change their outmoded manufacturing plants but to beseech the courts to bar the outlanders. The record industry has taken a similar tack.*
>
> —Karl Taro Greenfeld[15]

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. It was wildly popular and had more than 50 million users little more than a year later. Almost 100 million MP3 files were available on the service. Webnoize found that almost 75% of college students it surveyed used Napster. It was well known that Napster users copied and distributed most of the songs they traded without authorization. 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.[16]

The Napster case is important for many reasons. The fact that so many people participated in an activity that courts decided was illegal is an indication of how new technology challenges existing law and attitudes about what is acceptable. Many people thought the success of Napster meant the end of copyright. Instead the court decision showed that the legal system can still have a powerful impact. The arguments in the case apply to many other sites and services on the Internet.

The issues in the lawsuit against Napster were the following:

- Was the copying and distribution of music by Napster users legal under the fair use guidelines?
- If not, was Napster responsible for the actions of its users?

Napster argued that the sharing of songs by its users was a legal fair use. Let's review the fair use guidelines and how they apply.

Copying songs via Napster does not fit any of the general categories of purposes covered by fair use (e.g., education, research, news), but neither does copying movies on tapes. The *Sony v. Universal City Studios* case showed that the Supreme Court is willing to include entertainment as a possible fair use purpose.

Napster argued that sharing songs via its service was fair use because people were making copies for personal, not commercial, use. Copyright experts said "personal" meant very limited use—say, within a household—not trading with thousands of strangers.

Songs (lyrics and music) are creative material. Users copied complete songs. Thus, fair use guidelines (2) and (3) argue against fair use, but, as the Sony case indicated, they do not necessarily outweigh other factors.

The final, and perhaps most important, point is the impact on the market for the songs—that is, the impact on the income of the artists and music companies that hold the copyrights. Napster argued that it did not hurt record industry sales; users sampled music on Napster and bought the CDs they liked. The music industry claimed Napster severely hurt sales. Survey and sales data did not unequivocally support either side. Sales data showed sales rising significantly during most years in the 1990s, and dropping or rising only slightly in 2000. For example, music sales in the United States (the largest market) dropped 1.5% in 2000. Sales of singles were down 46%.[17] We do not know if Napster was the only reason for the declines, but it is reasonable to conclude that the huge volume of copying on Napster had a negative impact on sales and that the impact would grow.

Many legal observers thought the large-scale copying by Napster users was illegal copyright infringement, not fair use, and that is how the court ruled.

But was Napster responsible for copyright infringement by its users? Napster did not keep copies of songs on its computers. It provided lists of available songs and lists of users logged on at any time. Users transferred songs from each other's hard disks using peer-to-peer software downloaded from Napster. Napster argued that it was similar to a search engine and that a new law, the Digital Millennium Copyright Act (which we discuss at length in Sections 4.2.2 and 4.2.3), protected it from responsibility for copyright violations by its users. The record companies argued that the law requires companies to make an effort to prevent copyright violations and that Napster did not take sufficient steps to eliminate unauthorized songs or users who committed violations.

Napster cited the Sony Betamax case, in which the court said the maker of devices with substantial legitimate uses is not liable for users of the device who infringe copyrights, even if the maker knows some will. Napster had substantial legitimate uses in promoting new bands and artists who were willing to let users copy their songs. The recording industry argued that Napster was not a device or new technology, and it was not asking to ban a technology or shut Napster down. The record companies objected to how Napster *used* widely available technology to aid copyright infringement. It wanted Napster to stop listing songs without permission of the copyright owners.

Sony's relationship with a customer ended when the customer bought the Betamax machine. Napster interacted with its members in providing access to songs they copied. The court said Napster was liable because it had the right and ability to supervise its system, including the copyright-infringing activities, and had a financial interest in those activities. Napster was a business. Although it did not charge for copying songs, it expected the free copying to attract users so that it would make money in other ways.

The court ruled in 2001 that Napster "knowingly encourages and assists in the infringement of copyrights."[18] 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. Another company bought the "Napster" name and set up a legal streaming music subscription service.

What consumers want from the entertainment industry

Why was Napster so popular? When I asked my college students (while the illegal version of Napster was thriving in 2000), many shouted out "It's free!" That's the obvious reason, but it was not the only one. My students quickly generated a list of other desirable features of Napster. They could get individual songs without having to buy a whole CD to get the ones they wanted. They could sample songs to see if they really wanted them. Through Napster, they had access to a huge "inventory," not limited to one particular store or music label. They could get songs that were not commercially available. They liked the convenience of getting their music online. They could download and play a song from anywhere; they did not need to have a physical CD with them. The Napster site provided information about singers and musicians. Users could chat online with other users while they downloaded songs in the background. Thus, Napster used a variety of then-new technologies to provide flexibility, convenience, and services, in addition to free music.

The record companies did not embrace the new technologies. They expected their customers to continue to buy CDs from stores or order on the Web and wait a few days for shipping. They were used to the old paradigm of getting paid by each customer for each copy and were reluctant to allow or accept distribution of songs in file formats that people could easily copy.

When people began to post video clips from television shows and movies about five years later, content owners reacted like the record companies. They tried to stop the phenomenon rather than seek new business models to make it work.

More file sharing: MGM v. Grokster

About the time of the Napster decision, numerous companies and Web sites (Gnutella, Morpheus, Kazaa, and others) sprang up to provide a new kind of peer-to-peer file-sharing service. These systems enabled copying of files among users on the Internet without a central service, like Napster, to sue when users infringe copyrights. Within months of Gnutella's appearance, more than a million files were available. Many were unauthorized MP3 music files and unauthorized software. In *MGM v. Grokster*, the music and movie industry sued Grokster and StreamCast Networks (the owner of Morpheus). Although the companies did not provide a central service or list of music files available on the disks of users (as did Napster), they provided the software for sharing files. Technologists and supporters of file sharing argued that peer-to-peer file-transfer programs had potential for many productive, legal uses. (They were correct.) However, the Supreme Court ruled unanimously that intellectual property owners could sue the companies for encouraging copyright infringement. (At about the same time, an Australian court made a similar ruling against Kazaa.)

The Napster and Grokster decisions made it clear that businesses that encourage copyright infringement and provide tools to do so as a fundamental part of their business

Plagiarism and copyright

Plagiarism is the use of someone else's work (usually written work), representing it as one's own. Among students, it typically means copying paragraphs (with perhaps small changes) from websites, books, or magazines and incorporating them, without attribution, into a paper the student submits for a class assignment. It also includes buying a term paper and submitting it as one's own work. Novelists, nonfiction writers, and journalists sometimes plagiarize sections or complete works from other authors. Plagiarism was a problem before there were computers, but word processors and the Web have made it easier by making so much information available and making copying as easy as cut and paste.

Most often, the author of the plagiarized material does not know of or authorize its use, so plagiarism often includes copyright infringement. If the material is in the public domain or if someone agrees to write a paper for another, it is not copyright infringement, but it still might be plagiarism.

Plagiarism is dishonest. It misappropriates someone else's work without permission (usually) and without credit. In academia, it is a lie to the instructor, a false claim to have done an assignment oneself. In journalism or publishing, it is a lie to the employer or publisher and to the public. Plagiarism violates school rules and is considered a serious breach of professional ethics.

Thousands of high schools and colleges submit student term papers and essays to a service, turnitin.com, that checks them for plagiarism. Turnitin compares the student work to its database of millions of student papers and to material on the Web and in journal archives. The service builds its database of student papers by adding those submitted for checking. Several students sued the company for infringing their copyrights by adding their papers to the database. A federal appeals court ruled that turnitin.com's storage of student term papers is a fair use. Turnitin copied the entire paper and is a commercial entity. However, the facts that it provides a service very different from writing a term paper and that its service does not reduce the market for a student's paper weighed more strongly.[19]

Social conventions can influence the determination of what is plagiarism. For example, the public and book publishers generally know that ghostwriters write books for politicians and celebrities even when only the politician's or celebrity's name appears as the author. Few call this practice plagiarism.

model cannot operate legally in the United States. Many file-sharing companies settled suits with the entertainment industry, paying millions of dollars. Many shut down. Critics of the decisions worried that they threatened development of new peer-to-peer technology and applications.

"Look and feel"

Does copyright apply to user interfaces? The term "look and feel" of a program refers to features such as pull-down menus, windows, icons, and finger movements and the specific ways one uses them to select or initiate actions. Two programs that have similar

user interfaces are sometimes called "workalike" programs. The internal structure and programming could be entirely different. One program might be faster or have other advantages. Should the look and feel of a program be copyrightable? Does a workalike program infringe the copyright of the earlier program it resembles?

In the 1980s and 1990s, some companies won copyright infringement suits against others whose software had similar look and feel. An appeals court, reversing one such case, ruled that menu commands are "a method of operation," explicitly excluded from copyright protection. They are, the court said, like the controls of a car.[20] The trend of court decisions has been against copyright protection for "look and feel." Courts ruled that features such as overlapping windows, pull-down menus, and common operations like cut and paste are outside the scope of copyright.

The main argument in favor of protecting a user interface is that it is a major creative effort. Thus, the usual arguments for copyright and patent apply (e.g., rewarding and encouraging innovation). On the other hand, standard user interfaces increase productivity of users and programmers. We do not have to learn new interfaces for each program or device. Programmers do not have to "reinvent the wheel"—that is, design a new interface just to be different. They can concentrate on developing the truly new aspects of their programs. The value of similar interfaces for browsers, smartphones, and so on, is now well recognized and taken for granted.*

4.2 Responses to Copyright Infringement

4.2.1 Defensive and Aggressive Responses From the Content Industries

The entertainment industry employs numerous approaches in its efforts to prevent unauthorized use of its products. Its methods include technology to detect and thwart copying, education about copyright law and reasons to protect intellectual property, lawsuits (both reasonable and abusive), lobbying for expansions of copyright law (both reasonable and not), lobbying to restrict or prohibit technologies that aid copyright infringement, and new business models to provide digital content to the public in convenient forms.

Ideas from the software industry

A variety of techniques for protecting software developed early, with varying success. For example, software companies encoded an expiration date in free sample versions of software; the software destroyed itself after that date. Some expensive business software included a hardware *dongle*, a device that the purchaser has to plug into a port on the computer so that the software will run, thus ensuring that the software runs on only

* Several companies have patents on the screen technologies that enable touch commands.

International piracy

Some countries traditionally have not recognized or protected intellectual property, including copyrights, patents, and trademarks. Counterfeiting of brand name products, from blue jeans to expensive watches and medicines, is common in some parts of the world. Ignoring foreign copyrights on books and other printed material has long been common practice in many countries as well. Thus, software, music, and movie piracy in these countries are variants of an old phenomenon. Websites that sell or share games, software, and entertainment files without authorization thrive in many countries.

The Business Software Alliance (BSA), a software industry organization, estimates that piracy accounts for 42% of personal computer software in use worldwide. The regions with the highest rates are Central and Eastern Europe and Latin America.[21] (Obviously, it is difficult to get accurate figures for illegal activities. BSA makes estimates by considering the number of computers sold, the expected average number of software packages on each computer, and the number of software packages sold.)

Many countries with high piracy rates do not have a significant software industry. Thus, they do not have domestic programmers and software companies to lobby for protection of software. The lack of a domestic software industry may be an effect, as well as a contributing cause, of weak legal protection for software. It is difficult for such an industry to develop when it cannot recover its investment in software development. The fact that the major software companies are from other countries, and rich ones, may make both the people and the governments less inclined to take action to reduce unauthorized sales. In the United States, with its many legitimate sellers of entertainment and software, customers are likely to know when they are buying illegal products or sharing unauthorized files. In countries where it is common to purchase food unpackaged in outdoor markets, customers might not think there is anything unusual (or wrong) about the way unauthorized vendors sell software and music. It could be easier for a consumer to find a street vendor selling, say, a U.S. movie on DVD, than to find an authorized dealer. Another reason for piracy in some countries is that the economies are weak and the people are poor. (Some U.S. movie companies sell DVDs in China at relatively low prices to attract customers away from the illegal market.) Thus, culture, politics, economic development, low incomes, and lax enforcement of intellectual property laws are all contributing factors.

The BSA calculated that the software piracy rate in China was 98% in 1994. The U.S. government has repeatedly pressured China's government to improve intellectual property protection, and China has repeatedly announced programs to do so, but with relatively little impact. As China's economy has grown, its government has made more effective efforts to reduce illegal production, sale, and use of intellectual property. Recognition that poor intellectual property protection hindered its own content industries contributed to increased copyright protection in China. For example, under pressure from a Chinese company that represents U.S. music companies and owns rights to thousands of Chinese songs, China's major search engine removed thousands of links to sites that offered pirated songs. Court decisions against infringement of foreign copyrights and jail sentences for offenders increased. In China, personal computer manufacturers used to sell their machines bare, without an operating system. This practice encouraged people to buy cheap, unauthorized copies. In 2006, the Chinese government required that all PCs be sold with an authorized operating system preinstalled. Also, according to the BSA, the Chinese government significantly reduced the use of unauthorized software by its own government agencies. The BSA reports that the software piracy rate in China dropped to 78% in 2010. (A Chinese study, based on surveys, reported a 45% rate for 2010.)[22] For comparison, the BSA gives a rate of 20% for the United States.

Decoys

Some music companies adopted a clever tactic to discourage unauthorized file sharing: They put a large number of damaged music files, called "decoys," on file-sharing sites. The decoys might, for example, fail to download properly or be full of scratchy noises. The idea was that people would become frustrated and stop using the file-sharing sites if a large percentage of the songs they tried to download would not play properly. Movie companies adopted the tactic too, scattering many fake copies of new movies on the Internet.

one machine at a time. Diskettes containing consumer software had "copy protection" to ensure that you could not copy it (or that a copy would not run). Some software requires activation or registration with a special serial number. Some of these systems were "cracked"—that is, programmers found ways to thwart the protection mechanisms. Many companies dropped these techniques, largely because consumers dislike the inconvenience that accompanies them. Some of these early access controls later developed into the more sophisticated digital rights management schemes for entertainment and ebooks that we discuss later in this section.

Software industry organizations, dubbed "software police," were active in business offices before they began policing cyberspace. In most cases, violations of copyright law were so clear that the business or organization agreed to big fines rather than go to trial. Software copying by businesses decreased, due in part to better understanding of the ethical issues involved and in part to fear of fines and exposure in a business climate that gradually came to view large-scale copyright violation as not acceptable.

Law enforcement agencies raided swap meets, warehouses, and other sites and prosecuted sellers of pirated software (and, later, music CDs and movie DVDs). Courts handed out severe penalties for organized, large-scale efforts. For example, 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 worth more than $20 million. Similarly, 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.

Banning, suing, and taxing

Via both lawsuits and lobbying, the intellectual property industries have delayed, restricted, or prevented services, devices, technologies, and software that make copying easy and that people are likely to use widely in ways that infringe copyrights, although they also have many legal uses. The technology for consumer CD-recording devices for music was available in 1988, but lawsuits filed by record companies delayed its introduction. A group of companies, including a television network and the Walt Disney Company,

sued the makers of digital video recording machines that store TV programs and can skip commercials. The movie and record industries delayed introduction of DVD players by threatening to sue companies that make them if consumers could copy movies on the devices. 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. Diamond eventually won, partly because the court interpreted the Rio as a player, not a recorder, that allowed people to play their music at different locations—just as the Sony decision (Section 4.1.6) said people could watch TV shows at different times.[23] Some observers believe that Apple's iPod would not have been possible if the RIAA's lawsuit against the Rio had succeeded.

As new companies introduced a variety of new products and services to deliver entertainment in flexible and convenient ways, the costs of fighting industry lawsuits effectively shut some of them down—with no trial to decide whether their products were legal.

The entertainment industry pushed hard for laws and industry agreements to require that makers of personal computers and digital recorders and players build copy-protection mechanisms into their products. It pressured device makers to design their systems so that files in unprotected formats do not play well—or at all. Such requirements could reduce illegal copying, of course. However, they interfere with use and sharing of homemade works. They complicate sharing of material in the public domain. They restrict legal copying for personal use and other fair uses. Laws requiring or prohibiting specific features violate the freedom of manufacturers to develop and sell products they consider appropriate.

Software and entertainment companies targeted Internet service providers, threatening legal action against those whose subscribers operate file-sharing services or trade unauthorized files via peer-to-peer software, pressuring them to cancel accounts of alleged offenders. The entertainment industry sued or took other legal action against thousands of people for downloading or sharing unauthorized music files. Letters to college students threatened fines of thousands of dollars. Eventually, recognizing that the lawsuits angered customers and were not particularly effective in stopping copying and sharing, the industry cut back on the policy of mass lawsuits. Instead, the industry made agreements under which ISPs warn customers who transfer music or movies illegally and may close the accounts of customers who ignore the warnings.

As an alternative to banning devices that increase the likelihood of copyright infringement, several governments, including most in the European Union, tax digital media and equipment to pay copyright holders for losses expected from unauthorized copying. They introduced special taxes on photocopiers and magnetic tape in the 1960s and later added taxes on personal computers, printers, scanners, blank DVDs, recorders, iPods, and cellphones. Advocates of these taxes argue that makers of copying equipment are responsible for losses their equipment causes for intellectual-property owners and that the tax schemes are a reasonable compromise in a situation where it is difficult to catch each infringer.

Analogies and perspective

Should we ban or restrict software, a technology, a device, or research because it has the potential for illegal use, or should we ban only the illegal *uses*? This question addresses a principle covering much more than copyright infringement. In Chapter 2, we described the FBI's and NSA's pressure for banning telephone technology that is difficult to tap and encryption schemes that were difficult for them to crack. Law enforcement agencies advocate banning anonymous Web browsing and email, because they can hide criminal activity. The issue of banning or restricting tools that have criminal uses arises in numerous areas unrelated to computer technology. Some U.S. cities prohibit sale of spray paint to minors, because they might paint graffiti on walls. Of course, they might paint a table. Some cities ban chewing gum, because some people discard the gum on the street, making a mess. Many countries prohibit ordinary people from owning guns to protect their homes or businesses, because some people misuse guns. Laws ban drug paraphernalia, because people might use it with illegal drugs. Some of these laws make prevention of specific crimes easier. For example, it might be hard to find the person who painted graffiti, but it is easy to reduce the sale of spray paint by threatening shop owners with fines.

In a free society, which should win: the freedom of people to develop and use tools for legal purposes, or the prevention of potential crimes? Those who reject the policy of banning a tool that has both legitimate and illegal uses argue its absurdity by taking it to its extreme: Should we ban matches because arsonists use them? Others argue that we should look at each application individually, considering the risks of harm. Proponents and lobbyists for bans on tools usually rank the damage they could cause (in general or to the interests of their clients) more highly than the loss of freedom and convenience to those who would use the tool honestly and productively. We can rarely predict all the creative and innovative (legal) uses of a new technology. Bans, delays, and expensive restrictions often cost all of society the unforeseen benefits. The technologies listed in Section 4.1.2 as causes of problems for intellectual-property protection are the foundation of incredible benefits that we enjoy.

Critics argue that the taxes make equipment more expensive, penalize equipment makers unfairly, charge honest users unfairly, and politicize the difficult job of fairly distributing the money collected.

Digital rights management

Digital rights management technologies (DRM) are a collection of techniques that control access to and uses of intellectual property in digital formats. DRM includes hardware and software schemes using encryption and other tools. DRM implementations embedded in text files, music, movies, ebooks, and so on, can prevent saving, printing, making more than a specified number of copies, distributing a file, extracting excerpts, or fast-forwarding over commercials.

More about encryption: Section 2.5.1

There are many criticisms of digital rights management. DRM prevents fair uses as well as infringing uses. It can prevent extraction of small excerpts for review or for a fair use in a new work, for example. You cannot play or view protected works on old or incompatible machines and operating systems (e.g., Linux). We have long had the right to lend, resell, rent out, or give away a physical book, record, or CD that we owned. (These activities do not require making a copy.) If we could not lend or give a book to a friend, the friend might buy a copy, providing income to the copyright owner. But in 1908, the Supreme Court established the principle that the copyright owner has the right only to the "first sale" of a copy.[24] Publishers, especially of textbooks, which resell often, lobbied for legislation requiring a royalty to the publisher on each resale; they were unsuccessful. DRM enables the content seller to prevent lending, selling, renting, or giving away a purchased copy.

DRM differs in a fundamental way from the banning, suing, and taxing we described earlier. Companies that use DRM on their products are not interfering with other people or businesses. They are offering their own products in a particular way. It is a way that has disadvantages to the public, but surely a publisher should be free to offer its products in whatever form it chooses. If the car model we want to buy comes only in black, white, or green, we cannot demand that the company provide one in orange. But we can buy one and paint it orange. Can we do the equivalent with intellectual property wrapped in DRM? In the next section, we will see that a law says we often cannot.

4.2.2 The Digital Millennium Copyright Act: Anticircumvention

Congress passed the Digital Millennium Copyright Act (DMCA) in 1998. This very important law has two significant parts. The "anticircumvention" provisions prohibit circumventing technological access controls and copy-prevention systems implemented by copyright owners in intellectual property. The "safe harbor" provisions protect websites from lawsuits for copyright infringement by users of the site. We discuss the anticurcumvention provisions in this section and safe harbor in the next one.

Circumventing access controls

Programmers and researchers regularly find ways to crack or thwart (or "circumvent") DRM, sometimes to infringe copyright on a large scale and sometimes for a variety of legal purposes. The "anticircumvention" provisions of the DMCA prohibit making, distributing, or using tools (devices, software, or services) to circumvent DRM systems used by copyright holders. (There are exceptions. We mention some later.) These provisions are extremely controversial. The law provides for heavy penalties and fines for violators. The ideal purpose of the DMCA is to reduce piracy and other illegal uses of intellectual property. However, it criminalizes actions that do not infringe any copyrights. It outlaws devices and software that have legitimate purposes, which court decisions protected

before the DMCA. Content companies use the law in ways that threaten fair use, freedom of speech, research, competition, reverse engineering, and innovation. We give some examples.[25]

The first major legal cases based on the DMCA involved the Content Scrambling System, or CSS, a protection scheme for movies. Three programmers, including 15-year-old Jon Johansen of Norway,* wrote and distributed a program, called DeCSS, that defeated the scrambling.[26] DeCSS could be used to create numerous unauthorized copies. But DeCSS also enables users of the Linux operating system to view (legally purchased) DVDs on their computers. It enables the legal owner of a DVD to view the disk anywhere in the world. (Some movie companies use incompatible codes in Europe and the United States.) Several Hollywood studios sued people who posted DeCSS on their websites. Attorneys in a prominent case argued that people could use DeCSS for fair uses, that banning it violated freedom of speech, and that programmers need to discuss computer code and techniques. None of these arguments mattered much. The judge ruled that DeCSS was illegal under the DMCA and ordered its removal from the Web.[27] Soon after the decision, descriptions of DeCSS appeared on the Web in haiku, bar code, short movies, a song, a computer game, and art.[28] Most of these publications of the code were protests of the judge's decision. They demonstrate how difficult it is to distinguish between expression of an opinion, which the First Amendment strongly protects, and computer code, a form of speech the judge said the government could more easily regulate.† Jon Johansen was tried in Norway under a Norwegian law. The Norwegian court ruled that it was not illegal to break DVD security to view legally purchased DVDs and that the prosecutors had not proved Mr. Johansen used the program to illegally copy movies. In the United States, the movie industry continued to win cases.

A team of researchers responded to a challenge by the Secure Digital Music Initiative (SDMI), an industry consortium, to test its digital watermarking schemes (a form of copyright protection) for music files. The researchers quickly found ways to thwart several of the techniques and planned to present a paper on the flaws in the protection schemes at a conference. The head of the research group, Princeton University computer science professor Edward Felten, said SDMI threatened lawsuits based on the DMCA. He decided not to present the paper.[29] The DMCA has exceptions for actions necessary for encryption research and computer security, but the scope of the exceptions is limited and unclear. This case showed that the DMCA and the industry's threats of lawsuits have a chilling effect on publication of research. Software engineering journals worried about liability for some research papers they might publish. A major book publishing company decided not to publish a planned book on security vulnerabilities in popular game consoles. A computer science professional organization argued that fear of prosecution under the DMCA could

* The others chose to remain anonymous.

† Recall that encryption export rules (discussed in Chapter 2), like the DMCA, restricted publication of research and software, but eventually a judge ruled that software is a form of speech.

cause researchers and conferences to leave the United States, eroding its leadership in the field. Felten and other researchers sued for a court ruling that the anticircumvention provisions of the DMCA (when applied to software and research) violate the First Amendment. The case ended after the recording industry and the government issued statements that lawsuits under the DMCA against scientists and researchers studying access control technologies were not appropriate.[30]

Russian programmer arrested for violating the DMCA: Section 5.4.1

We saw in several cases in Section 4.1.6 that courts ruled, before the DMCA, that copying for reverse engineering to produce new products was a fair use. Now, people and companies avoid reverse engineering because the legality under the DMCA remains murky. New, innovative products that might have come to market, but do not because of the DMCA, are invisible.

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*.* Originally, for example, Apple allowed only AT&T service contracts for iPhones; George Hotz figured out how to circumvent this limitation, as well as limitations on Sony game machines. Jailbreaking certain devices also lets users disable the feature that allows remote deletion of an app from the user's device. These uses do not infringe copyright. However, Apple[31] threatened DMCA lawsuits against a website that hosted discussion of reverse engineering iPods so that they could work with software other than iTunes. Other companies threatened suits for similar dicussions for other devices.

Exemptions

The Library of Congress decides on exemptions to the DMCA's anticircumvention provisions.[32] It now allows circumvention of CSS for fair use purposes. It allows an exemption for research on security vulnerabilities in access controls on CDs, but not as yet for research on such vulnerabilities for, say, video games. It 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. But the rule does not allow the same actions, for similar purposes, on other devices.[33] There is an exemption for circumventing access controls on ebooks to allow use of text-to-speech software (a useful function for blind people). However, the circumvention is legal only if *all* existing editions of the book have access controls that prevent enabling a read-aloud function or a screen reader.

As these examples illustrate, the exemptions the Library of Congress grants are very narrow. Many allow only a small action that does not infringe copyright and was legal before the DMCA. The exemptions come after years of threats, legal expenses, and delays in innovating new products or using lawfully purchased products. This is a very poor way to structure a law.

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* I am using the terms informally, not with technical definitions.

4.2.3 The Digital Millennium Copyright Act: Safe Harbor

The "safe harbor" provisions of the DMCA protect websites from lawsuits and criminal charges for copyright infringement when users post infringing material. The site operators must make a good-faith attempt to keep infringing material off their sites. They must remove such material when asked to do so by the copyright owners (often publishers and music and movie companies). They can lose the protection if they profit from the infringing material. Like the safe harbor provisions of the Telecommunications Act of 1996 (Section 3.1.1) for other kinds of illegal content, this was a welcome protection for website owners and the public. It recognized that websites with user content have tremendous social value, but operators could not review everything members post. The safe harbor provisions of the DMCA, along with technological advances in the next several years, encouraged the development of thousands of websites that host user-generated content, including blogs, photos, videos, recipes, reviews, and the myriad other creative works we share on the Web. Holding the sites legally liable for copyright-infringing material a user might post could have severely restricted this phenomenon.

On the other hand, such sites include a huge amount of copyrighted material, from short clips from movies, TV shows, and concerts to entire movies and other shows. Copyright owners request removal of their content (and links to their content) by sending so-called takedown notices. Entertainment companies began sending floods of takedown notices. Infringing material appears and reappears faster than content owners can find it and request its removal.*[34] The entertainment industry and other content companies are unhappy that they have to bear the responsibility and expense of continually searching sites for material that infringes their copyrights and sending the takedown notices. They question the applicability of the safe harbor provision to large commercial websites such as YouTube. The companies argue that the large advertising revenue these sites take in depends in part on the unauthorized content. The safe harbor provision requiring the takedown notices might have been appropriate for legitimate websites of the 1990s whose business plans did not depend on users posting huge amounts of content. Today's sites, they argue, are similar to the peer-to-peer music sites (like Grokster) that made their money on the intellectual property of others without permission. They argue that the sites should have the responsibility of filtering out copyright-infringing material. The burden should not be on the copyright holders. Supporters of the safe harbor provisions fear that weakening safe harbor protection would threaten the many websites that host user-generated material. Viacom sued YouTube and asked for $1 billion in damages.[35] Viacom complained that it found 100,000 of its videos on YouTube. YouTube responded that it complied with the law. It regularly removes video clips when Viacom informs the company that the clips infringe Viacom copyrights. Video-sharing site Veoh won a similar case against a lawsuit by Universal Music both at the trial level and on appeal in 2011.

* Google, for example, takes down millions of links to copyright-infringing sites each year.

However, Veoh declared bankruptcy; it cited the huge legal costs. The Viacom case against YouTube, filed in 2007 and still in the courts, could clarify the extent of efforts a site must make to keep out infringing material.* In the meantime, technology has helped reduce the burden. Much of the detection and removal of infringing material is now automated. The content industries, large video sites, and social-networking sites use sophisticated tools to search through user-generated content for copyrighted material posted without authorization.

Although the safe harbor provision was a generally positive and important move, the takedown process has some weaknesses for websites and the public, as well as for the copyright holders. The takedown requirement of the DMCA is clearly open to abuse that threatens free speech and fair competition. Copyright holders are likely to interpret fair use principles narrowly and send takedown notices for material that might be fair use. A study of takedown notices found for about 30% of the notices there is significant question whether the material actually does infringe copyright. The fair use provisions protect much of it—for example, quotations from a book in an unfavorable book review. In one incident, Wendy Seltzer, a law professor, posted a video clip from a football game. YouTube removed it after the National Football League sent a takedown notice, then reposted it when Seltzer claimed it was an educational fair use (demonstrating issues about copyright—the clip included the NFL's copyright notice), then took it down again after the NFL sent another takedown notice. More than half of the notices businesses send to Google demanding removal of links to allegedly infringing Web pages come from competitors of the targeted sites.[36] How can search engine companies and websites evaluate all the takedown notices they receive? How should they respond when they receive a notice that they believe is intended to silence critics or undermine competitors? It is often not obvious how a court will interpret the fair use guidelines. Website operators are likely to protect themselves by complying with requests from large content companies with large legal staffs.

The entertainment industry and other content companies lobby to curtail the safe harbor provisions of the DMCA.[37] They argue that they need more legal tools to shut down pirate sites outside the United States. As in other situations where it is difficult to find or stop the people who are doing what the government wants to stop, the content companies would put more burden of enforcement (and penalties) on legitimate companies. For example, they advocate requiring ISPs to block access to designated infringing sites and requiring payment companies (e.g., Paypal and credit card companies) to stop processing payments to such sites. There is strong debate about how new stringent requirements would affect YouTube, search engines, Flickr, Twitter, and so on, as well as many small sites that do not have the staffs and expertise to comply. Critics of such requirements warn that the standards the industy uses to identify infringing sites are too

* The DMCA is a U.S. law. Lawsuits in Europe have had varying results. YouTube won a case in Spain but lost one in Germany.

vague and broad, that ISP blocking can open security vulnerabilities, and that blocking access and funding, once begun, tends to expand to other purposes and threatens freedom of speech. Piracy continues to be a major headache and cost for the creators and owners of intellectual property. The challenge continues to be finding effective ways to reduce it without burdening legitimate activities and businesses or thwarting innovation and development of new services.

> *Washington regulating the Internet is akin to a gorilla playing a Stradivarius.*
>
> ——L. Gordon Crovitz, Information Age columnist for the *Wall Street Journal*[38]

4.2.4 Evolving Business Models

> *The more we attempt to provide government protection to the old ways of doing business, the less motivation we provide to the entertainment industry to adapt and benefit from new technology.*
>
> —Les Vadasz, former vice president of Intel[39]

The success of Apple's iTunes, which has sold more than ten billion songs and tens of millions of videos, shows that companies can sell digital entertainment successfully, from the point of view of the customers and the rights holders. After the Supreme Court decision in *MGM v. Grokster* (Section 4.1.6), people who wanted to operate legitimate businesses providing music realized that they had to make agreements with, and payments to, music companies. The entertainment industry initially viewed new distribution technologies, such as peer-to-peer file-sharing, podcasting, and streaming content, as threats—as the movie industry did with video cassette recorders in the 1980s, before it got the idea that it could earn billions by renting and selling movies on cassettes. It seemed to take a long time, but many entertainment companies came to realize that people who share music files are people who like music; they are potential customers. The industry began to explore new business and marketing models. Music subscription services now thrive, with millions of songs available and hundreds of thousands of subscribers. They operate under agreements with the music companies. Similarly, many companies offer (authorized) movie download services.

For years, the music industry fought against distribution of music in (unprotected) MP3 format. Steve Jobs and some people in the entertainment industry argued that DRM was ineffective against piracy. Between 2007 and 2009, a major shift occurred in music sales. EMI Group, Universal Music Group, and Sony (some of the largest music companies in the world) began selling music without DRM. Apple eliminated DRM from its iTunes store for music. The debate about DRM continues within the movie and book industries. Some see DRM as essential to protect against piracy. They fear the industries

will suffer severe economic losses if they do not include access controls on digital content. Others point out that pirated movies circulate unprotected. Controls and restrictions on legally sold content encourage irritated consumers to seek out illegal, unprotected copies even though they are willing to pay.

Some entertainment companies and Web content-sharing sites negotiate contracts for the site to pay a share of its ad revenue to the entertainment companies. YouTube and Warner Music Group, for example, worked out such an arrangement for Warner music videos. Sharing sites can use filtering software that examines files as people upload them, looking for digital "fingerprints" of the entertainment company's properties. Depending on agreements between the companies, the site can block a post entirely or pay the entertainment company for its appearance on the site. This is a creative way to allow users to post entertainment company material or include such material in their (usually noncommercial) creations without the overhead and legal liability for getting permissions. It makes sense that the Web companies that benefit from the advertising and have the assets and expertise to develop and use the sophisticated filtering tools make the payments, instead of individual users.

Safe harbor in the cloud?

Cloud services store a customer's files on online servers so that they are synched among the customer's devices and available from anywhere. Some cloud services enable sharing for small organizations or businesses. Cloud storage raises copyright issues. 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 on their servers? Unlike on public sites such as YouTube, an individual's content stored in the cloud is not visible to other people or to movie and music companies. The copying is personal from the perspective of the user, but the cloud service operator stores and provides the content to the individual conveniently as part of its business. Since copyright holders do not see what is stored, they do not have the option of sending takedown notices. If cloud services adopt a system of filtering or checking for content that infringes copyright, how will they manage it to protect fair use and the privacy of the user?

What does not work

Some attempts at new business models do not work. Zediva, a small startup in 2011, bought DVDs. It rented them to customers, but it did not send the physical DVD. Instead, it streamed the movie to the renter. Zediva argued that if it could rent the physical DVD without authorization from the studios, as do services such as Netflix under the first sale doctrine (Section 4.2.1), then it should be legal to rent it digitally over the Internet, streaming a movie from one DVD to only one renter at a time. The movie studios argued that streaming a movie is a public performance, which requires authorization. A court agreed and Zediva shut down.[40] Does this interpretation of the law make sense? Should Zediva's variant on streaming be legal?

Some business models appear intended to get around copyright law while helping people distribute illegally copied video. How far can they go? The Pirate Bay case (in Sweden, 2009) addressed the issue of whether the site violated Swedish copyright law by helping users find and download unauthorized copyrighted material (music, movies, computer games) even though the site itself did not host the material. Four organizers of the Pirate Bay were convicted of contributory copyright infringement. The Motion Picture Association of America has sued several other sites that do not host infringing videos but provide links to sites that do. It has won some of the suits. Do these sites differ in any fundamental way from the original Napster and Grokster? Should merely listing or linking to sites with unauthorized files be illegal?

Cyberlockers are services that provide storage of large files on the Web. Members transfer hundreds of thousands of files daily on popular sites. As on Napster more than a decade ago, singers and musicians store files on cyberlockers for free downloads to promote their work. The term cyberlocker, however, often refers to services that either intentionally encourage sharing files (e.g., movies) without authorization or structure their business in ways that make copyright infringement on a huge scale easy. The entertainment industry cites Megaupload, a cyberlocker that did more than $100 million in business (e.g., from membership fees), as an example of this form of piracy. Megaupload operated from Hong Kong and New Zealand, with servers in several countries, including the Netherlands. It had 180 million registered users. It claimed that its terms of use prohibited copyright infringement and that it took down infringing material when notified to do so. Determining whether a particular business illegally contributes to copyright infringement depends on consideration of the factors that are required for safe harbor protection and how seriously the business complies. 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. Other cyberlocker businesses modified some of their practices to protect themselves from legal action.[41]

4.3 Search Engines and Online Libraries

Copying is essential to many of the operations and services of search engines. In response to search queries, search engines display copies of text excerpts from websites and copies from images or video. In order to respond to user queries quickly, they copy and cache* Web pages and sometimes display these copies to users. Search engine companies copy entire books so that they can search them and display segments in response to user queries. Besides their own copying, search engines provide links to sites that might contain copyright infringing material. Individuals and companies have sued Google for almost every search service it provides (Web text, news, books, images, and video). Should

* Caching, generally in computer science, means storing data in specialized memory, frequently updated, to optimize transfer of the data to other parts of a system that use it.

Tools for authorized sharing

Many authors and artists, including those who sell their work on the Web, are willing to share—to a degree. How can they easily—without a publishing company's staff of lawyers and without the overhead of explicit authorization—indicate what they are willing to let others do with their work? From the user perspective, how does someone who wants to copy, say, a photo from someone else's website determine if he or she must get permission or pay a fee? Many people are willing to respect the preferences of an author or artist, but it is often not easy to determine what those preferences are.

Creative Commons,[42] a nonprofit organization, developed a spectrum of licensing agreements inspired by the GNU General Public License for software (Section 4.4). The licenses, which the author or artist announces to viewers by a choice of clickable icons, explicitly permit a selection of actions normally requiring authorization from the copyright owner. They provide a large degree of flexibility. For example, one can allow or disallow copying for commercial uses, require a specified credit line with any use, allow copies or display of the entire work only if there are no changes, allow use of pieces of the work in new works, or put the entire work in the public domain. Like so much on the Web, the use of the licenses and associated software is free. The photo site 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.

Easy-to-use schemes like this eliminate confusion and expensive overhead. They facilitate and encourage sharing while protecting the wishes of intellectual property owners.

search engines need authorization for the copying essential to search services? Should they be paying fees to copyright owners? As always, uncertainties about the legal status of industry practices can delay innovation. Google boldly introduces new services amid complaints of copyright infringement, but fear of lawsuits has deterred smaller companies that cannot estimate business costs in advance if they do not know their liability. We consider arguments related to a few of the contested practices.

The search engine practice of displaying copies of excerpts from Web pages seems easily to fit under the fair use guidelines. The excerpts are short. Displaying them helps people find the website with the excerpted document—usually an advantage to the site. In most cases, the site from which the search engine copies the excerpt is public, available to anyone who wants to read its content. Web search services are a hugely valuable innovation and tool for the socially valuable goal of making information easily available. In *Kelly v. Arriba Soft,* an appeals court ruled that copying images from Web pages, converting them to thumbnail images (small, low-resolution copies), and displaying the thumbnails to search engine users did not infringe copyrights. In *Field v. Google*, an author sued Google for copying and caching a story he had posted on his website. Caching involves copying entire Web pages. The court ruled that caching Web pages is a fair use. In dismissing a similar suit that challenged both caching and the practice of displaying excerpts from a website, a court compared Google to an ISP that makes copies of Web pages to display

them to users. For ISPs, automatically and temporarily storing data to transmit to users does not infringe copyright.[43]

There are, however, some reasonable arguments on the other side. Most major operators of search engines are businesses. They earn significant revenue from advertising. Thus, the copying accomplishes a commercial purpose. The display of short excerpts can reduce income to copyright holders in some situations. A group of Belgian newspapers claimed they lose revenue from subscription fees when Google displays headlines, photos, and excerpts from their news archives. They won a lawsuit against Google (in a Belgian court) in 2007. In response to similar lawsuits and disputes with other news services, Google negotiated licensing agreements to copy and display headlines, excerpts, and photos.

Trademarked search terms

The practice of selling search terms raises intellectual property issues for trademarks. 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 or the names of some of its products? Users searching for one company will see its competitor's ads. A company that makes software for learning foreign languages sued a competitor and Google over this issue. The case (*Rosetta Stone Ltd. v. Google Inc.*), filed in 2009, is still in the courts.

Books online

Project Gutenberg began converting books in the public domain into digital formats in the 1970s. Volunteers typed the entire text of the books—inexpensive scanners were not yet available. The University of California agreed to let Microsoft scan millions of books in its collection that are in the public domain. Google's project of scanning books in major university libraries differs in that Google scans books covered by copyright. Google provides entire books for download, but only those that are in the public domain. For books still under copyright protection, Google Book Search provides short excerpts from the books. Does Google's project infringe copyrights? How does the impact on the market for books differ from the impact of people browsing books in a library? How does it compare to providing excerpts from newspaper articles, as in the Belgian case we described above?

Publishers and authors filed several lawsuits against Google for copying their books. The court so far has rejected several versions of long, complex settlement agreements that Google and the publishers devised in *The Author's Guild et al v. Google, Inc.*. The agreements cover, among other things, sharing of proceeds from sales of out-of-print works, setting prices, and how much of a book Google could display as fair use, without payment. The main reason for the judge's rejection of the agreement in 2011 is that it would give Google significant rights to use books in the future in new ways, not related to the actions that the original lawsuit covered and without approval of copyright owners.

It would also release Google from liability for some future actions. In effect, it rewards Google "for engaging in wholesale copying of copyrighted works without permission."[44]

A French publisher, La Martiniere, won a suit against Google (in France) for scanning its books and putting extracts online without permission. Google and La Martiniere made an agreement to split revenue from digital sales of books.

Similar legal and ethical issues arise again each time technology makes copying and searching of more complex content (movies, for example) possible, especially for content produced explicitly to earn revenue (again, movies, for example). We see that search engine companies sometimes negotiate contracts with major intellectual property owners for displaying excerpts from and/or providing links to content such as images, news archives, television programs, books, and so on. Such contracts recognize that the search companies benefit from the use of another company's intellectual property, that some uses threaten the revenue of the copyright holders, and hence that, for both legal and ethical reasons, a search engine company might need permission to copy and display intellectual property for certain purposes.

4.4 Free Software

In Chapter 1, we talked about all the free stuff on the Web. Individuals post information and create useful websites. Large groups of volunteers, who do not know each other, collaborate on projects such as Wikipedia. Experts share their knowledge and contribute their work. This creation of valuable information "products" is decentralized. It has little or no "management" in the business sense. It flows from incentives other than profits and market pricing. This phenomenon, which some call "peer production," has a predecessor: the free software movement, begun in the 1970s.[45]

4.4.1 What Is Free Software?

Free software is an idea, an ethic, advocated and supported by a large loose-knit group of computer programmers who allow and encourage people to copy, use, and modify their software. The *free* in free software means freedom, not necessarily lack of cost, though often there is no charge. Free software enthusiasts advocate allowing unrestricted copying of programs and making the source code (the human-readable form of a program) available to everyone. Software distributed or made public in source code is *open source*, and the open source movement is closely related to the free software movement. (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 (though the GNU name dates from 1983). It began with a UNIX-like operating system, a sophisticated text editor, and many compilers and utilities. GNU now has hundreds of programs freely available and

popular among computer professionals and skilled amateur programmers.* In addition, thousands of software packages are available as free software, including audio and video manipulation packages, games, educational software, and various science and business applications.[46]

Free software has many advantages. With freely distributed software, more people can use and benefit from a program. With source code available, any of thousands of programmers can find and fix bugs quickly. Users and programmers can adapt and improve programs. Programmers can use existing programs to create new and better ones. Stallman compares software to a recipe. We can all decide to add a little garlic or take out some salt without paying a royalty to the person who developed the recipe.

To enforce the openness and sharing of free software within the current legal framework that provides copyright protection, the GNU project developed the concept of *copyleft*.[47] Under copyleft, the developer copyrights the program and releases it under an 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. In other words, no one may develop a new program from a copylefted program and add restrictions that limit its use and free distribution. The widely used GNU General Public License (GPL) implements copyleft. Courts uphold copyright protection for open source software. A federal court said a person who distributes open source software can sue for an injunction against someone who uses the software for commercial products without following the open source licensing agreement.[48]

For a long time, technically savvy programmers and hobbyists were the principal users of free software. Commercial software companies were hostile to the idea. That view changed gradually, then more dramatically, with the Linux operating system.† Linus Torvalds wrote the Linux kernel in 1991. Torvalds distributed it for free on the Internet, and a global network of free software enthusiasts continue development. At first, Linux was difficult to use, not well suited as a consumer or business product. Businesses referred to it as "cult software." Two early users were the company that did the special effects for the movie *Titanic* and the NASA Goddard Space Flight Center. Gradually, small companies began selling a version of Linux along with manuals and technical support, and, eventually, major computer companies, including IBM, Oracle, Hewlett-Packard, and Silicon Graphics, used, supported, and marketed it. Large businesses such as Royal Dutch/Shell and Home Depot adopted Linux. Several movie studios adopted Linux for their special effects and digital animations. Dell sold PCs with Linux installed. Other examples of popular free software include Firefox, the Web browser provided by Mozilla, and Apache, the most widely used program to run websites. Google's mobile operating system, Android, which is Linux-based, has elements of free and open source software.

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* "GNU" is an acronym for "GNU's Not UNIX." (Programmers like recursive acronyms.)

† Technically, Linux is the kernel, or core part, of the operating system. It is a variant of the earlier UNIX operating system. Other parts are from the GNU project, but the whole operating system is often referred to as Linux.

Major companies began to appreciate the benefits of open source. Several now make source code for their own products public, allowing free use in noncommercial applications. Sun Microsystems licensed the Java programming language under GPL.* Adopting the view of the free software movement, companies expected that programmers would trust the software more if they could see how it operates. Programmers might be more likely to use it and to improve it. IBM placed full-page ads in major newspapers announcing that it "embraced Linux and the open-source movement as a pillar of e-business."[49] IBM donates hundreds of its patents to the open source community. Free software became a competitor for Microsoft, and so those who are critical of Microsoft's products and influence see it as a considerable social benefit.

Critics (and some supporters) of free software point out some of its weaknesses. Much free software is not easy for ordinary consumers to use. Often, there is no technical support number to call for help. (Programmers and users share information about problems and fixes on very active websites.) 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. They are uncomfortable with the loose structure of the free software movement. Some of these weaknesses faded as businesses learned how to work with a new paradigm. New businesses developed to support and enhance free software (like Red Hat for Linux), and more established businesses embraced the movement.

The spirit behind free software and open source spread to other forms of creative work. For example, the Berkeley Art Museum provides digital artworks online with their source files and allows people to download and modifiy the art.

4.4.2 Should All Software Be Free?

Some people in the free software movement do not believe that copyright should protect software at all. They argue that all software should be open source, free software. Thus, here we consider not the question "Is free software a good thing?" but "Should free software be the only thing?" When considering this question, we must take care to clarify the context of the question. Are we looking at it from the point of view of a programmer or business deciding how to release software? Are we developing our personal opinion about what would be good for society? Or are we advocating that we change the legal structure to eliminate copyright for software, to eliminate proprietary software? We will focus on the last two: Would it be good if all software were free software? And should we change the legal structure to require it?

Free software is undoubtedly valuable, but does it provide sufficient incentives to produce the huge quantity of consumer software available now? How are free software developers paid? Programmers donate their work because they believe in the sharing ethic.

* Oracle acquired Sun in 2010.

They enjoy doing what they do. Stallman believes that many good programmers would work like artists for low pay out of commitment to their craft. Contributions, some from computer manufacturers, support some free software efforts. Stallman has suggested government grants to universities as another way of funding software.

Would such funding methods for free software be sufficient? Most programmers work for a salary, even if they write free software on their own time. Would the extra services for which a business could charge bring in enough revenue to support all software development? Would the free software paradigm support the kinds of consumer software sold in millions of copies? What other funding methods could developers use?

A supporter of free software used the analogy of listener-supported radio and television. It is a good analogy for free software, but not one for eliminating proprietary software, because most communities have one listener-supported station and numerous proprietary ones.

Stallman believes that proprietary software—particularly, the aspect that prohibits people from making copies and changes in programs without the software publisher's approval—is ethically wrong. He argues that copying a program does not deprive the programmer, or anyone else, of use of the program. (We saw some counterarguments to this viewpoint in Section 4.1.5.) He emphasizes the distinction between physical property and intellectual property. He also points out that the primary purpose of copyright, as stated in the U.S. Constitution, is to promote progress in arts and sciences, not to compensate writers.[50]

For those who oppose copyright and proprietary software completely, the concept of copyleft and the GNU Public License provide an excellent device for protecting the freedom of free software within the current legal framework. For those who believe there are important roles for both free and proprietary software, they are an excellent device with which the two paradigms can coexist.

4.5 Patents for Inventions in Software*

> *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. I use some terms informally, not in their precise legal meanings. The aim here is to present an overview of the controversies, not a legal analysis.

A smartphone might involve as many as 250,000 (largely questionable) patent claims.

—David Drummond, Chief Legal Officer of Google[51]

Google, Apple, and Microsoft paid billions of dollars to buy thousands of wireless and smartphone patents. It is generally recognized that the companies do not buy the patents because they need them for products they are developing. They buy patents so that they can sue other companies for patent infringement when the other companies sue them for patent infringement. Google explicitly said it bid (billions of dollars) on thousands of Nortel patents to "create a disincentive for others to sue Google" and to protect continued innovation in Android and other projects.[52] It is common for news articles to refer to "arsenals of patents" and to explicitly call patents "weapons." The large-scale defensive (and offensive) accumulation of patents is a symptom of problems with patents for innovations implemented in software and patents for business methods. (Business methods, in our context, include innovations such as one-click shopping, recommending products based on a customer's history, privacy controls, pop-up ads, and marketing to smartphones.) Fierce controversies rage over such patents. One controversy is over whether there should be patents for business methods and software-based inventions at all. There is also controversy about many specific patents and about the criteria for granting software-related patents. Billions of dollars and future technology development depend on how these controversies are resolved.

How does—and how should—patent law apply to innovations implemented in software? We will consider both aspects of this question. First, we review the murky state of patent law in this area.

4.5.1 Patent Decisions, Confusion, and Consequences

Patents protect inventions by giving the inventor a monopoly for a specified period of time.* Patents differ from copyrights in that they protect the invention, not just a particular expression or implementation of it. Anyone else who wants to use the patented invention or process must get the authorization of the patent holder, even if the other person independently came up with the same idea or invention. One device or machine might involve many patents. Since 1895, for example, thousands of patents (with some estimates over 100,000), have been issued covering various aspects of the automobile. Laws of nature and mathematical formulas cannot be patented. Nor are patents to be granted for an invention or method that is obvious (so that anyone working in the field would have used the same method) or if it was in use by others before the filing of the patent application.

* Under current law, the period is 20 years from the time of application.

A patent holder can build and sell the patented device or devices using the patented element. Also, the patent holder may license others to do so for a license fee, or royalty. Businesses routinely pay license fees to use patented inventions in their products.

The U.S. Patent and Trademark Office (which I will simply call the Patent Office) evaluates patent applications and decides whether to grant them. In the early days of computing technology, the Patent Office did not issue patents for software. In 1968, it 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, interpreting Supreme Court guidelines loosely. 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, and so on. The Patent Office has a backlog of more than 600,000 patent applications. It grants an estimated 40,000 software patents each year. With hundreds of thousands of companies producing software, there are simply not enough patent attorneys to review the patents and determine if a new software product would violate an existing patent.[53]

Courts have made several attempts to clarify the conditions for innovations based in software to be patentable, often issuing decisions that reject prior criteria. Some decisions depended on whether software produced "a useful, concrete, and tangible result," whether a business method "transforms a particular article into a different state or thing," and whether the term "process" in patent law includes "methods." If these phrases and terms do not seem to clarify the criteria, that is the point. A significant Supreme Court ruling in 2007 (*KSR v. Teleflex*) broadened the definition of "obvious" for rejecting patents. In 2010 (*Bilski v. Kappos*), the court reemphasized that a patent must not give control over an abstract idea or mathematical algorithm. The decision declared a previous standard for software patentability to be only a "useful and important clue," not a determining factor, adding more fuzziness.[54] Justice Kennedy summed up the difficulties in making patent decisions and the court's declining to make a clear, general decision about software patents:

> It is important to emphasize that the Court today is not commenting on the patentability of any particular invention, let alone holding that any of the above-mentioned technologies from the Information Age should or should not receive patent protection. This Age puts the possibility of innovation in the hands of more people and raises new difficulties for the patent law. With ever more people trying to innovate and thus seeking patent protections for their inventions, the patent law faces a great challenge in striking the balance between protecting inventors and not granting monopolies over procedures that others would discover by independent, creative application of general principles. Nothing in this opinion should be read to take a position on where that balance ought to be struck.[55]

We saw that application of the fair use criteria for determining copyright infringement leads to uncertain results. The situation for patents is far more confused and unsettled. Judgments in some patent cases are close to or above $1 billion. Uncertainty and lawsuits are expensive, and they delay innovation.

A few cases

Decisions about granting patents are complex, as are decisions about whether a device or method infringes a patent. Reasonable decisions require knowledge of details of the particular case, expertise in the area, and knowledge of history of related technology. Establishing that an invention is not obvious and is not in use is difficult in fast-developing fields such as Web and smartphone technologies, especially when the Patent Office staff must research and process a large number of patent applications. The Patent Office makes mistakes. Various organizations, including the Electronic Frontier Foundation, argue that many patented techniques are not particularly new or innovative. For example, Amazon.com generated a lot of criticism when it sued Barnesandnoble.com for violating its patent on one-click shopping. Many in the industry objected that the government should not have granted the patent in the first place. (The companies settled the suit without disclosing the terms.)

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 while the Patent Office reconsiders the patents.[56]

Apple won a patent case against a maker of Android phones. It covers technology that allows a user to tap a touch screen to perform various tasks, such as calling a phone number that is in an email or text message. We can expect more lawsuits over software-related patents for smartphones.

Many Web users remember Amazon innovating the idea of recommending books to customers based on their previous purchases. But Amazon might not have originated the technique for doing so. IBM sued Amazon for violating several of its patents on e-commerce techniques. IBM had obtained a patent on electronic catalogues in 1994, before online retail was common. The patent covers a wide area, including targeted advertising and recommending specific products to a customer. Eventually, Amazon agreed to pay IBM a licensing fee.[57]

Patent trolls

Some companies accumulate thousands of technology patents, including many of the type of software patents and business method patents we are discussing. The firms buy most or all of their patents from individuals or other companies. They do not make any products. They license the patents to others and collect fees. Intellectual Ventures (co-founded by former Microsoft executive Nathan Myhrvold) is an example. The firm has an

estimated 30,000 patents.* It says it has collected close to $2 billion in license fees. Some such companies make all or a significant part of their income by suing other companies for patent infringement (for hardware as well as software patents). Critics call these companies "patent trolls," a pejorative term.

Some see the existence of patent-licensing firms as an indication of a serious flaw in the patent system. However, *if* the patents themselves are legitimate (still an open question for many), this business model is not unreasonable. Marketing and negotiating contracts for patent licenses are services that an inventor might have neither the skills for nor the desire to do. A person or company might be better at inventing and patenting new technologies than at implementing them in a successful business. In a highly specialized economy, the existence of firms that buy and license patents is not in itself a negative thing. There are many analogous services in other contexts. (For example, some farmers sell their crop well in advance of harvest to free themselves from risks of market fluctuation. Firms with expertise in economics and risk analysis are the buyers.) However, as many critics of the current state of software patent law observe, when companies collect patents mainly or only to bring lawsuits for patent infringement, the law does not seem to be serving the goal of encouraging innovation well.

4.5.2 To Patent or Not?

In favor of software patents

The main arguments for allowing patents for software-based inventions and certain business methods are similar to those for patents and copyright in general. They reward inventors for their creative work. By protecting rights to the work, they encourage inventors to disclose their inventions so that others can build upon them. They encourage innovation.

Before the digital age, inventions were physical devices and machines. A huge portion of the astounding number of innovative developments in computing and communication technology consists of techniques implemented in software. These inventions have contributed enormous value to all of us. We take many for granted now, but they were truly innovative. Someone thought them up and developed them. Patents help to reward those people ethically and fairly and to encourage more innovation. Patent protection is necessary to encourage the large investment often required to develop innovative systems and techniques.

Businesses routinely pay royalties and license fees for use of intellectual property. It is a cost of doing business, like paying for electric power, raw materials, and so on. Software-related patents fit into this well-established context.

Copyright covers some software, but it is not sufficient for all of it. Software is a broad and varied field. It can be analogous to writing or to invention. A particular computer

* Intellectual Ventures obtained some of its patents on inventions it developed.

game, for example, might be analogous to a literary work, like a novel, and copyright would be appropriate. On the other hand, the first spreadsheet program, VisiCalc, introduced in 1979, was a remarkable innovation that had enormous impact on ways of doing business planning and on the sales of computer software and hardware. Similarly, the first hypertext system, the first peer-to-peer system, and many of the innovations that make smartphones so useful have characteristics more like new inventions. Patent might be more appropriate for such innovations.

Against software patents

Critics of software patents include those who oppose software patents in general as a matter of principle and those who conclude that the system developed so far has done a very poor job. Both see patents for software as stifling innovation, rather than encouraging it.

There are now so many software patents that it is difficult for software developers (individuals writing apps or large companies developing new technology) to know if their software infringes patents. 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. The costs of lawyers to research patents and the risk of being sued discourage small companies from attempting to develop and market new innovations. Businesses cannot sensibly estimate costs of new products and services when lawsuits are so common and results so uncertain. Even large companies, as we indicated earlier, amass patents as defensive weapons for inevitable lawsuits.

If courts uphold patents for software techniques, common e-commerce and smartphone features, and so on, then prices will go up and we will see more incompatible devices and inconsistent user interfaces. In Section 4.1.6, we reviewed earlier controversies about copyrighting user interfaces (the "look and feel" of software systems). The principle that evolved in those cases—that uniformity of interfaces is valuable and that the look and feel should not be copyrightable—suggests a similar principle for patentability of user interfaces for smartphones.

It is difficult to determine what is truly original and to distinguish a patentable innovation from one that preempts an abstract idea, mathematical formula, or fact of nature. (Indeed, many computer scientists see all algorithms as mathematical formulas.) The very fact that there are so many controversial software and business method patents argues against granting these kinds of patents. The Supreme Court has not been able to arrive at clear, consistent legal criteria. This legal confusion suggests that it might be better not to issue patents in these areas.

Evaluating the arguments

Some of the problems of software patents are problems of patents in general. That does not mean we should abandon them; most things have advantages and disadvantages. (It does suggest areas for possible improvement.) Lawsuits over patents for physical inventions are common. (The holder of the 1895 patent on an automobile sued Henry Ford.)

Intellectual property law is a subset of property rights law. For complex areas, it sometimes takes many years to work out reasonable principles.* Software patent holders sue others who independently develop the same techniques, but all patents allow such suits. That is an unfair aspect of patents. Does it do significantly more damage for software-related inventions than for other inventions?

That there has been an enormous amount of innovation in the past decades is obvious. Looking at the same facts and trends, some see patents on software as essential to this innovation, whereas others see them as threatening it. While the patent system has some big flaws, it is likely one of the important factors that contributed to the centuries of innovation in the United States. Legal scholars and software industry commentators emphasize the need for clear rules so that companies can do their work without the threat of changing criteria and unforeseen lawsuits. So, is the idea of patenting software innovations fundamentally flawed, or is it that reasonable criteria have not yet developed? If the latter, is it better to stop granting such patents in the meantime, while better criteria develop, or is it better to continue to issue software patents?

Several Supreme Court justices stated in the *Bilski* case that, while certain patent criteria were useful for the industrial age, the information age and its new technologies need a new approach. We do not have a good new approach yet.

EXERCISES

Review Exercises

4.1 What are the four factors to consider in deciding whether a use of copyrighted material is a fair use?

4.2 Give an example in which plagiarism is also copyright infringement, and give an example in which it is not.

4.3 Summarize the main reasons why the court in the Sony Betamax case ruled that videotaping a movie from television to watch later was not an infringement of copyright.

4.4 Give an example of a device the music or movie industry has tried to ban.

4.5 Give two examples of uses of intellectual property that DRM controls.

4.6 What are the two main provisions of the Digital Millennium Copyright Act?

4.7 List some benefits of free software (in the sense of Section 4.4).

4.8 What was one type of controversial patent for a software-related innovation?

General Exercises

4.9 Describe two things the entertainment industry has done to protect its copyrights. For each, tell whether you think the action is justified. Give reasons.

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* Riparian law is a good example. If you own property that includes part of a river, do you have the right to build a dam, say, to produce energy or make a recreational lake? Do you have a right to a certain amount of clean water flowing by regularly? The two are incompatible; the latter implies that the owner upstream cannot build a dam.

4.10 Your uncle owns a sandwich shop. He asks you to write an inventory program for him. You are glad to help him and do not charge for the program. The program works pretty well, and you discover later that your uncle has given copies to several friends who also operate small food shops. Do you believe your uncle should have asked your permission to give away your program? Do you believe the other merchants should pay you for the copies?

4.11 A political group organized a forum on its website to encourage people to post and comment on individual newspaper articles relevant to political issues of concern to the group. Other participants added their comments, and debate and discussion of the articles continued. Two newspapers sued, arguing that posting the articles violated their copyrights. Analyze the case. How do the fair use guidelines apply? Who should win?[58]

4.12 During the 2008 presidential campaign, a graphic designer found a photo of Barack Obama on the Internet, modified it to look more like a graphic design, and made the very popular "Hope" campaign poster without credit to the photographer or permission from the Associated Press, which owns the photo. AP argued that the designer infringed AP's copyright and that the design, on sweatshirts, etc., produced hundreds of thousands of dollars in income. The designer claimed his use was a fair use. Using the fair use criteria, evaluate the claims.[59]

4.13 You are a teacher. You would like your students to use a software package, but the school's budget does not include enough money to buy copies for all the students. Your school is in a poor neighborhood, and you know most of the parents cannot afford to buy the software for their children.

(a) List some ways you could try to obtain the software without making unauthorized copies.

(b) Suppose the methods you try do not work. Will you copy the software or decide not to use it? Give some arguments for and against your position. Explain why you think the arguments on your side are stronger.[60]

4.14 Which of the following activities do you think should be a fair use? Give reasons using copyright law and/or court cases. (If you think the ethically right decision differs from the result that follows from applying the fair use guidelines, explain how and why.)

(a) Making a copy of a friend's spreadsheet software to try out for two weeks, then either deleting it or buying your own copy.

(b) Making a copy of a computer game, and playing it for two weeks, then deleting it.

4.15 Describe a situation involving making a copy of a computer program or an entertainment file of some sort for which you think it is difficult to decide if the copying is ethical or not. Explain the reasons for the uncertainty.

4.16 Mr. J wrote the first serious book on the problem of stuttering about 45 years ago. The book is out of print, and Mr. J has died. Mr. J's son wants to make this classic work available to speech pathologists by scanning it and putting it on his Web page. The publisher held the copyright (still in effect), but another company bought out the original publishing company. The son does not know who has the copyright now.

(a) Analyze this case according to the fair use guidelines. Consider each of the criteria and tell how it applies. Do you think Mr. J's son should post the book?

(b) Suppose Mr. J's son does put the book on the Web and that the publishing company holding the copyright asks a judge to issue an order for Mr. J to remove it. You're the judge. How would you rule? Why?

4.17 Preservationists are reluctant to transfer some very old movies on old, deteriorating film to digital formats because of difficulties in determining and locating the copyright owners. What aspect of copyright law contributes to this problem? Suggest some solutions.

4.18 Service Consultants, a software support company, provides software maintenance service to customers of a software vendor. Service Consultants copied the vendor's program, not to resell the software but to provide service for clients. The vendor sued, and the service company argued that the copying was a fair use. Give arguments for each side. Which side do you think should win? Why?[61]

4.19 Describe an important benefit of the safe harbor provisions of the DMCA. Describe an important weakness of the safe harbor provisions from the perspective of the entertainment industries. Describe an important weakness from the perspective of the public.

4.20 A search engine company copies millions of books in a university library, including books in the public domain and books still protected by copyright. It displays segments—say, a paragraph—in response to user search requests. Analyze how the fair use guidelines apply to this practice for the books still covered by copyright. Should the copying and display be considered fair use, or should the company need permission from the copyright holders? (If you think the ethically right decision differs from the decision that follows from applying the fair use guidelines, explain how and why.)

4.21 The first Mickey Mouse cartoon appeared more than 80 years ago. Give ethical and/or social arguments both for and against each of the following uses of the cartoon or the Mickey Mouse character without authorization from the company that owned or owns the copyright. Tell which side you think is stronger, and why. Do not consider the copyright time period under current law or arguments about the ethics of obeying or breaking laws.

(a) Post a digitized copy of the original cartoon on a video-sharing site.

(b) Use the Mickey Mouse character as the spokeperson in an advertisement very strongly critical of a candidate running for president.

(c) Edit a digitized copy of the original cartoon to improve visual and sound quality, produce copies with the dialog dubbed in various other languages, and sell thousands of copies in other countries.

4.22 Companies selling music or movies (for example) can include digital rights management tools that cause files to self-destruct after a specified amount of time. Give some advantages and disadvantages of this practice. Do you think it is ethical for entertainment businesses to sell content with such a limitation? Why or why not?

4.23 Do you think taxing media and devices that aid copyright infringement (as described on pages 199–200) is a reasonable solution for collecting fees to pay content providers? Give your reasons.

4.24 (a) Suppose the movie industry asks a court to order a website to remove links to other sites that review movies and provide unauthorized (complete) copies of the movies for downloading. Give arguments for each side. What do you think the decision should be? Why?

(b) Suppose a religious organization asks a court to order a website to remove links to other sites that have copies of the organization's copyrighted religious documents. Give arguments for each side. What do you think the decision should be? Why?

(c) If your decisions are the same for both cases, explain what similarity or principle led you to that conclusion. If your decisions differ for the two cases, explain the distinction between the cases.

4.25 Pick two of the actions mentioned in the first paragraph of this chapter and tell whether or not they are legal and why. If there is not enough information given, explain what your answer would depend on.

4.26 Compare the following statements. Are they equally valid (or invalid)? Why or why not? Is home burglary a good analogy for disabling copy protection? Why or why not?

> One side effect of the DMCA's anticircumvention provision is to reduce incentive for the entertainment and publishing industries to develop truly strong protection schemes. The DMCA allows them to use weak schemes and then threaten legal action against anyone who cracks them.
>
> One side effect of laws against burglary is to reduce incentive for homeowners to use sturdy locks. The law allows people to use weak locks and then take legal action against anyone who breaks in.

4.27 Which arguments for free software (as in Section 4.4) apply to music? Which do not? Give reasons.

4.28 A cook can modify a recipe by adding or deleting a few ingredients without getting permission or paying a royalty to the person who developed the recipe.

(a) Give an example of modifications of a professional song or a piece of software that is analogous to a cook using the recipe.

(b) Do you think your example satisfies the fair use guidelines? That is, is it very likely courts would consider it a legal fair use? Explain why.

(c) Copyright protects cookbooks. A court would likely find that selling a cookbook in which many of the recipes are slight modifications of recipes in someone's else's cookbook is copyright infringement. Give an example of modifications of a professional song or a piece of software that is analogous to selling such a cookbook.

4.29 Thomas Jefferson and several modern writers used fire as an analogy for copying intellectual property: we can light many candles from one without diminishing the light or heat obtained from the first candle. Suppose a group of people go camping in the wilderness using primitive methods. One person gets a fire started. Others want to start their fire from hers. Give ethical or practical reasons why they might be expected to trade something, perhaps some wild fruit they found, for the use of the fire?

4.30 In the 1990s, two writers suggested that software is a "public good" (like public schools and national defense), that we should allow anyone to copy it, and that the federal government should subsidize it.[62] Suppose this proposal had been adopted then. How well do you think it would have worked? How would it have affected the quantity and quality of software produced? Give reasons.

4.31 Describe one kind of software or technique used in software that you think is innovative, like an invention, for which patent protection might be appropriate.

4.32 Did you know, before you read this chapter, that restaurants pay fees for the music they play, community theaters pay fees for the plays they perform, and large companies routinely pay large fees to other companies for use of patented inventions and technologies? Does this long tradition of paying for intellectual property affect your view of the legitimacy of sharing entertainment on the Web without authorization? Give your reasons.

4.33 Assume you are a professional working in your chosen field. Describe specific things you can do to reduce the impact of any two problems we discussed in this chapter. (If you cannot think of anything related to your professional field, choose another field that might interest you.)

4.34 Think ahead to the next few years and describe a new problem, related to issues in this chapter, likely to develop from digital technology or devices.

Assignments

These exercises require some research or activity.

4.35 Read a license agreement for a software product. It could be a game, operating system, video editor, tax preparation program, and so on.

(a) What does the license agreement say about the number of copies you can make?

(b) Does it specify penalties for making unauthorized copies?

(c) Was the agreement easy to read before purchase (e.g., on the outside of the package or available on a website)?

(d) Do you consider the license agreement to be clearly stated? Reasonable?

4.36 Read the member agreement or policy statement of a website that hosts user videos. Give the name and Web address of the site you chose, and briefly describe it if it is not a well-known site. What does its statement say about posting files that contain or use works of others without authorization?

4.37 Find information about an entertainment industry copyright-infringement lawsuit against any one of the following: Hotfile, RecordTV.com, SonicBlue, YouTVpc.com, or Peekvid.com. Describe the issues involved and the result or current status of the case.

4.38 Find and describe the result or current status of *The Author's Guild et al v. Google, Inc.*, the lawsuit against Google for digitizing books without permission (Section 4.3).

4.39 Read the articles by Esther Dyson and Lance Rose from *Wired* (listed in the references below). Write a short essay telling which author's views about the future of intellectual property in the "digital age" have proved more accurate based on events in the years since they wrote the articles.

Class Discussion Exercises

These exercises are for class discussion, perhaps with short presentations prepared in advance by small groups of students.

4.40 A website hosts written works posted by authors. Some people post copyrighted work by other authors without permission. When an author asks the site to remove such material, the site complies and adds the work to its filter database to prevent reposting without permission. An author sues the site claiming the site infringes her copyright by storing her work. Argue the author's case. Argue the site's defense. Evaluate the arguments and decide the case.

4.41 Some people argue that digital rights management violates the public's right to fair uses.

(a) Should a person or company that creates intellectual property have an ethical and/or legal right to offer it for sale (or license) in a form protected by their choice of digital rights management technology (assuming the restrictions are clear to potential customers)? Give reasons.

(b) Should people have an ethical and/or legal right to develop, sell, buy, and use devices and software to remove digital rights management restrictions for fair uses? Give reasons.

4.42 Debate whether Congress should repeal the Digital Millennium Copyright Act's anticircumvention provisions.

4.43 Which factor is or will be more important for protection of digital intellectual property: strict copyright laws (and strict enforcement) or technology-based protections (or neither)? Why?

4.44 With respect to copyright issues for digital media and the Web, in what ways are entertainment companies victims? In what ways are entertainment companies villains?

4.45 Debate whether software should be copyrightable or should be freely available for copying.

4.46 Discuss to what extent the finger movements we use to navigate on a smartphone touch screen should be patentable.

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ORGANIZATIONS AND WEBSITES

- Chilling Effects Clearinghouse, a joint project of Stanford, Harvard, other universities, and the Electronic Frontier Foundation that helps to clarify and protect rights when misuse of intellectual property law chills freedom of speech: chillingeffects.org
- Creative Commons, an organization that provides a variety of free licensing tools for both protecting and sharing intellectual property on the Web: creativecommons.org
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- The Recording Industry Association of America: www.riaa.com
- The Software & Information Industry Association: www.siia.net

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52. Kent Walker, "Patents and innovation," *The Official Google Blog*, Apr. 4, 2011, googleblog.blogspot.com/2011/04/patents-and-innovation.html, viewed Dec. 20, 2011. The Nortel patents were sold in a bankruptcy auction.
53. The estimated number of software patents and the observation about the impossibility of checking them are from Christina Mulligan and Timothy B. Lee, "Scaling the Patent System," *NYU Annual Survey of American Law*, forthcoming (abstract at Social Science Research Network, papers.ssrn.com/sol3/papers.cfm?abstract_id=2016968##).
54. Key cases are *Diamond v. Diehr*, 450 U.S. 175 (1981); *State Street Bank & Trust Co. v. Signature Financial Group*, 1998; *In re Bilski*, Federal Circuit, 2008; *Bilski v. Kappos*, June 28, 2010, www.supremecourt.gov/opinions/09pdf/08-964.pdf, viewed Dec. 26, 2011. See also Daniel Tysver, "Are Software and Business Methods Still Patentable after the Bilski Decisions?" *Bitlaw*, 2010, www.bitlaw.com/software-patent/bilski-and-software-patents.html, viewed Dec. 21, 2011.
55. *Bilski v. Kappos*.
56. Susan Decker, "Paul Allen's Lawsuit against Apple, Google to Remain on Hold," *Bloomberg*, July 14, 2011, www.bloomberg.com/news/2011-07-14/paul-allen-s-lawsuit-against-apple-google-to-remain-on-hold.html, viewed Dec. 19, 2011.
57. Charles Forelle and Suein Hwang, "IBM Hits Amazon with E-Commerce Patent Suit," *Wall Street Journal*, Oct. 24, 2006, p. A3.
58. This exercise is based on the *Los Angeles Times v. Free Republic* case. The court's decision in favor of the newspapers seems inconsistent with the reasoning in the reverse engineering cases described in Section 4.1.6 and other fair use cases. It was criticized by some scholars.
59. The designer, Shepard Fairey, and AP settled out of court in 2011, with some details of the settlement confidential. Fairey later pleaded guilty to fabricating documents and lying during the litigation process.
60. This exercise was sparked by a brief note in Helen Nissenbaum, "Should I Copy My Neighbor's Software?" in Deborah G. Johnson and Helen Nissenbaum, *Computers, Ethics & Social Values*, Prentice Hall, 1995, p 213.
61. In a few such cases the software support companies were found to have infringed copyright. In 2010, Oracle won a large jury award from SAP for actions of its TomorrowNow unit, which provided support for Oracle software.
62. Barbara R. Bergmann and Mary W. Gray, "Viewpoint: Software as a Public Good," *Communications of the ACM*, October 1993, 36:10, pp. 13–14.