Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

ECEN 404
Software Use Ethics Case Study

Software use ethics

- Engineering is highly dependent on software as tools in the development, sales, and deployment of products and services and as engineered products.
- Software, as potentially valuable intellectual property, are protected by legal mechanisms that entitle the developer and assigned owners specific legal rights to the use, distribution, and sale of the intellectual property.
- As developers of and users of software, engineers should adhere to the terms of the legal protection instruments.
- In addition to legal requirements, ethical considerations should be applied when developing, using, distributing, and selling software assets.

US Software Protection Mechanisms

- Patent protection – prevents others from using an invention or discovery
- Copyright protection – protects the form of expression of "original works of authorship"
- Trade secret protection – protects undisclosed ideas used in business to obtain an economic advantage over competitors.
- Public domain – general term applied to information, inventions, discoveries, works where the above protections are inapplicable, were waived, were forfeited, or have expired.

What is a patent?

- A patent for an invention is the grant of a property right to the inventor, issued by the United States Patent and Trademark Office. Generally, the term of a new patent is 20 years from the date on which the application for the patent was filed in the United States …

- The right conferred by the patent grant is, in the language of the statute and of the grant itself, "the right to exclude others from making, using, offering for sale, or selling" the invention in the United States or "importing" the invention into the United States. What is granted is not the right to make, use, offer for sale, sell or import, but the right to exclude others from making, using, offering for sale, selling or importing the invention. …

Source: USPTO Website, General Information Concerning Patents

What can be patented?

- Any person who “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,” subject to the conditions and requirements of the law…
- The patent law specifies that the subject matter must be “useful.” The term “useful” in this connection refers to the condition that the subject matter has a useful purpose and also includes operativeness, that is, a machine which will not operate to perform the intended purpose would not be called useful, and therefore would not be granted a patent.
- Interpretations of the statute by the courts have defined the limits of the field of subject matter that can be patented, thus it has been held that the laws of nature, physical phenomena, and abstract ideas are not patentable subject matter.
- A patent cannot be obtained upon a mere idea or suggestion. The patent is granted upon the new machine, manufacture, etc., as has been said, and not upon the idea or suggestion of the new machine. A complete description of the actual machine or other subject matter for which a patent is sought is required.

Source: USPTO Website, General Information Concerning Patents

Patent Novelty and Non-obviousness

- In order for an invention to be patentable it must be new as defined in the patent law, which provides that an invention cannot be patented if:
  - "(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention" or
  - "(2) the claimed invention was described in a patent issued [by the U.S.] or in an application for patent published or deemed published [by the U.S.], in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention."….

- Even if the subject matter sought to be patented is not exactly shown by the prior art, and involves one or more differences over the most nearly similar thing already known, a patent may still be refused if the differences would be obvious. The subject matter sought to be patented must be sufficiently different from what has been used or described before that it may be said to be non-obvious to a person having ordinary skill in the area of technology related to the invention. For example, the substitution of one color for another, or changes in size, are ordinarily not patentable.

Source: USPTO Website, General Information Concerning Patents

Who can apply for a patent?

- According to the law, the inventor, or a person to whom the inventor has assigned or is under an obligation to assign the invention, may apply for a patent, with certain exceptions. If the inventor is deceased, the application may be made by legal representatives, that is, the administrator or executor of the estate. If the inventor is legally incapacitated, the application for patent may be made by a legal representative (e.g., guardian). If an inventor refuses to apply for a patent or cannot be found, a joint inventor may apply on behalf of the non-signing inventor.
- If two or more persons make an invention jointly, they apply for a patent as joint inventors. A person who makes only a financial contribution is not a joint inventor and cannot be joined in the application as an inventor…

Source: USPTO Website, General Information Concerning Patents

What rights do patent holder have?

- The patent contains a grant to the patentee...[that] confers “the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States or importing the invention into the United States” and its territories and possessions for which the term of the patent shall be generally 20 years from the date on which the application for the patent was filed in the United States…
- The exact nature of the right conferred must be carefully distinguished, and the key is in the words “right to exclude” in the phrase just quoted. The patent does not grant the right to make, use, offer for sale or sell or import the invention but only grants the exclusive nature of the right. …The patent only grants the right to exclude others from making, using, offering for sale or selling or importing the invention. Since the patent does not grant the right to make, use, offer for sale, or sell, or import the invention, the patentee’s own right to do so is dependent upon the rights of others and whatever general laws might be applicable. A patentee, merely because he or she has received a patent for an invention, is not thereby authorized to make, use, offer for sale, or sell, or import the invention if doing so would violate any law….
- Neither may a patentee make, use, offer for sale, or sell, or import his or her own invention if doing so would infringe the prior rights of others. A patentee may not violate the federal antitrust laws, such as by resale price agreements or entering into combination in restraints of trade, or the pure food and drug laws, by virtue of having a patent. Ordinarily there is nothing that prohibits a patentee from making, using, offering for sale, or selling, or importing his or her own invention, unless he or she thereby infringes another’s patent that is still in force. For example, a patent for an improvement of an original device already patented would be subject to the patent on the device.
- The term of the patent shall be generally 20 years from the date on which the application for the patent was filed in the United States … After the patent has expired anyone may make, use, offer for sale, or sell or import the invention without permission of the patentee, provided that matter covered by other unexpired patents is not used….

Source: USPTO Website, General Information Concerning Patents

Infringement of patents

- Infringement of a patent consists of the unauthorized making, using, offering for sale, or selling any patented invention within the United States or U.S. Territories, or importing into the United States of any patented invention during the term of the patent. If a patent is infringed, the patentee may sue for relief in the appropriate federal court. The patentee may ask the court for an injunction to prevent the continuation of the infringement and may also ask the court for an award of damages because of the infringement. In such an infringement suit, the defendant may raise the question of the validity of the patent, which is then decided by the court. The defendant may also aver that what is being done does not constitute infringement. Infringement is determined primarily by the language of the claims of the patent and, if what the defendant is making does not fall within the language of any of the claims of the patent, there is no literal infringement.
- Suits for infringement of patents follow the rules of procedure of the federal courts….

Source: USPTO Website, General Information Concerning Patents

Software Patents

- Software patents are generally utility patents with the invention being a machine or processes.
  - the application of functions, steps, operations, algorithms implemented or implementable (i.e. reducible to practice) in the machine.
  - algorithms and processes represented by the software (also reducible to practice. Excludes laws of nature, etc)
- Employers can and often do require an employee (inventor) to assign all patentable IP to the employer (assignee)
- Patents prevent others from using, modifying, selling software that embody the invention without licensing for the term of patent.
- Terms of usage of purchased software are often specified in purchase agreements. Use outside those conditions requires additional licensing.

Software Patent Violation Case

GLOBAL MARKETS MAY 17, 2010 / 7:08 AM / 9 YEARS AGO

Microsoft settles with VirnetX, to pay $200 million

NEW YORK (Reuters) - Microsoft Corp will pay $200 million to VirnetX Holding Corp and obtain a patent license to settle litigation accusing it of infringing two patents for communicating over the Internet.

Source: Reuters, website, copied 3/1/18, Original story 5/17/2010

* This settlement with VirnetX, widely considered a “patent troll”, settled a case filed in the US District Court for Eastern Texas, in Marshall. In 2015, 45% of all US patent cases were filed in this court!

What is a copyright

- Copyright is a form of protection provided to the authors of "original works of authorship" including literary, dramatic, musical, artistic, and certain other intellectual works, both published and unpublished. The 1976 Copyright Act generally gives the owner of copyright the exclusive right to reproduce the copyrighted work, to prepare derivative works, to distribute copies or phonorecords of the copyrighted work, to perform the copyrighted work publicly, or to display the copyrighted work publicly.
- The copyright protects the form of expression rather than the subject matter of the writing. For example, a description of a machine could be copyrighted, but this would only prevent others from copying the description; it would not prevent others from writing a description of their own or from making and using the machine. Copyrights are registered by the Copyright Office of the Library of Congress.

Source: USPTO Website, General Information Concerning Patents

Copyright FAQ

- **What is copyright?**
  Copyright is a form of protection grounded in the U.S. Constitution and granted by law for original works of authorship fixed in a tangible medium of expression. Copyright covers both published and unpublished works.
- **What does copyright protect?**
  Copyright, a form of intellectual property law, protects original works of authorship including literary, dramatic, musical, and artistic works, such as poetry, novels, movies, songs, computer software, and architecture. Copyright does not protect facts, ideas, systems, or methods of operation, although it may protect the way these things are expressed.
- **How is a copyright different from a patent or a trademark?**
  Copyright protects original works of authorship, while a patent protects inventions or discoveries. Ideas and discoveries are not protected by the copyright law, although the way in which they are expressed may be. A trademark protects words, phrases, symbols, or designs identifying the source of the goods or services of one party and distinguishing them from those of others.
- **When is my work protected?**
  Your work is under copyright protection the moment it is created and fixed in a tangible form that it is perceptible either directly or with the aid of a machine or device.
- **Do I have to register with your office to be protected?**
  No. In general, registration is voluntary. Copyright exists from the moment the work is created. You will have to register, however, if you wish to bring a lawsuit for infringement of a U.S. work.
- **Why should I register my work if copyright protection is automatic?**
  Registration is recommended for a number of reasons. Many choose to register their works because they wish to have the facts of their copyright on the public record and have a certificate of registration. Registered works may be eligible for statutory damages and attorney's fees in successful litigation. Finally, if registration occurs within five years of publication, it is considered *prima facie* evidence in a court of law.
- **Is my copyright good in other countries?**
  The United States has copyright relations with most countries throughout the world, and as a result of these agreements, we honor each other's citizens' copyrights. However, the United States does not have such copyright relationships with every country

Source: US Copyright Office website, FAQ

Software Copyright

- Software copyright is copyright law applied to machine readable software (source and, since the 1983 Apple v. Franklin ruling, object code).
- It has also been applied to graphics (GUI), sounds, and appearance as audiovideo expression.
- Copyright law is used to protect proprietary, open-source, and free software. It provides a basis for enforcement of software license agreements.
- Generally, any copying of copyrighted software should be avoided unless allowed by a licensing agreement.
  - *De minimus* use of small amounts of code has been allowed by courts in some cases.
  - For non-literal copying, the Abstraction-Filtration-Comparison test is a method of identifying substantial similarity among the protectable elements of the code for the purposes of applying copyright law.

Software Copyright Violation Case

The Eagle

Oracle sues Bryan firm TomorrowNow

By LAURA HENSLEY Eagle Staff Writer Mar 29, 2007 0

One of the world's leading business software companies has accused a Bryan-based competitor of stealing online information as a way to ultimately offer lower prices to customers, according to court documents.

Business software giant Oracle filed a lawsuit last week against TomorrowNow, a Bryan start-up, and its parent company, SAP. It was filed in a U.S. District Court in San Francisco.

Christopher Hockett, an attorney for Oracle, said in the suit that TomorrowNow downloaded more than 10,000 copyright software products and other confidential materials from Oracle by illegally logging on to its password-protected customer support site.

Source: The BCS Eagle, website, copied 3/1/18, Original story 2/29/2007

In November 2014, Oracle and SAP, which had acquired TomorrowNow, accepted an appeals court ruling for $356.7 million in damages.

What is a trade secret?

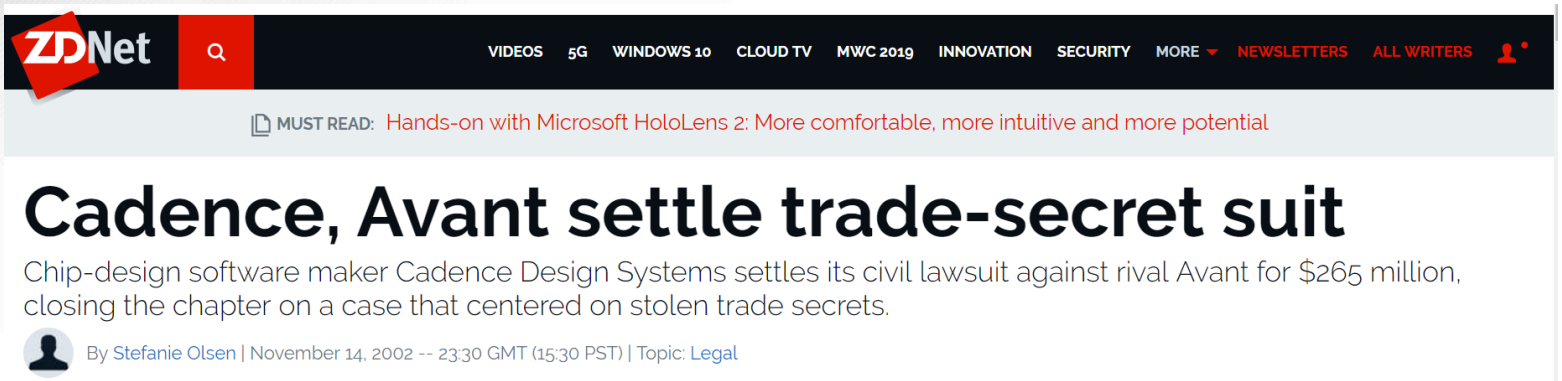
- Trade secrets consist of information and can include a formula, pattern, compilation, program, device, method, technique or process. To meet the most common definition of a trade secret, it must be used in business, and give an opportunity to obtain an economic advantage over competitors who do not know or use it.
- Courts can protect trade secrets by enjoining misappropriation, ordering parties that have misappropriated a trade secret to take steps to maintain its secrecy, as well as ordering payment of a royalty to the owner. Courts can also award damages, court costs, and reasonable attorneys' fees. This protection is very limited because a trade secret holder is only protected from unauthorized disclosure and use which is referred to as misappropriation. If a trade secret holder fails to maintain secrecy or if the information is independently discovered, becomes released or otherwise becomes generally known, protection as a trade secret is lost. Trade secrets do not expire so protection continues until discovery or loss.

Source: USPTO Website, General Information Concerning Patents

Software Trade Secrets

- Trade secret legal protection is often used for protecting proprietary software and software under development.
  - Once disclosed, trade secret protection is lost
  - Software intended for trade secret protection is often marked by its owner as “proprietary” and/or “confidential”.

Trade Secret Violation Case



Chip-design software maker Cadence Design Systems agreed to settle its civil lawsuit against rival Avant for $265 million, closing the chapter on a long-running case that centered on stolen trade secrets.

The suit stemmed from a criminal investigation begun in 1994 into allegations that workers at Avant, which develops software that helps the design of chips, lifted source code from rival Cadence and illegally used it in some products.

Source: ZDNet, website, copied 3/1/18, Original story 11/14/2002

Open-Source Software

- In open-source software, the copyright holder grants specific rights for the use of the software source, usually under the condition of attribution. Rights of alteration, sale, and distribution may also be included.
  - In 2008, in Jacobsen v. Katzer, the US federal appeals court held that open source license conditions are enforceable under copyright law.

Open-Source Software Licenses

- With growth in open-source software, standard licensing agreements for software developers and users have emerged. Some of the most common include:
  - Apache License 2.0
  - BSD 3 license
  - BSD 2-license
  - GNU General Public License
  - GNU Library General Public License
  - MIT license
  - Eclipse Public License
- Organizations such as the Free Software Foundation and Open Source Initiative develop and evaluate free and open-source license agreements.

Software and Plagiarism

"Plagiarism: The act of appropriating the literary composition of another, or parts or passages of his writings, or the ideas or language of the same, and passing them off as the product of one's own mind" – Black's Law Dictionary, 11th Edition.

- While patent, trade-secret, and copyright violations are punishable according to US civil law, plagiarism is not. The person plagiarizing may, however, in the process violate copyright, patent, or other civil laws.
- Many governmental agencies, private sector employers, and educational institutions (including Texas A&M) have employment and/or attendance policies that prohibit plagiarism.
- Plagiarism in software, appropriating code written by another as one's own, is an increasing issue with considerable ethical implications.

Incidents of Software Plagiarism

- According to a recent New York Times article:
  - A University of California professor discovered in one year that about 100 of his roughly 700 students in one class had violated the course policy on collaborating or copying code.
  - At Brown University, more than half the total of 49 academic code violations in 2016 involved computer science cheating.
  - In one computer science course in 2015 at Stanford, up to 20% of the students were reported for possible cheating.
  - In 2016 more than 60 of 655 students in Harvard's CS50 course were reported to the academic honor council for cheating violations.

Source: Jess Bidgood and Jeremy B. Merrill, "As Computer Coding Classes Swell, So Does Cheating," New York Times, 29 May 2017

Avoiding Software Plagiarism

- Know and follow your organization or institution's policy on copying of outside code:
  - Licensing requirements
  - Copying requirements
  - Requirements for documenting source and attribution of authorship.

- For classes that require programming, know and follow institution and instructor's policies on:
  - Use of outside code
  - Collaboration on programming projects
  - Documentation and attribution of non-original code

Coding Practices to Avoid Copyright / Plagiarism Claims

- Clean-room implementation
  - Code implementation is done in an environment without access to source documents, software, or other materials that are copyright or trade secret protected. (Others' patented inventions can, however, be infringed on by cleanroom code development. Recall patents protect the ideas, and copyright the expression.)

- Use good defensive coding practices, such as:
  - Substantial documenting within the code
  - Non-trivial variable, function, procedure, class, etc. naming
  - Human-speed keyboard code entry – large copy-paste transfers can be flagged by automated checking tools.
  - Clean partitioning of external, shared, or potentially license-controlled code from original content – maintaining all required licensing/source information.

Summary

- Software assets are potentially valuable intellectual property. Patent, copyright, and trade secret law are used to protect the owners of these assets.
- As developers of and users of software, engineers should adhere to the terms of the legal protection instruments and to the terms of the licensing agreements build upon these legal protections.
- In addition to legal requirements, ethical considerations should be applied when developing, using, distributing, and selling software assets.