

CSE3323: Intellectual Property, Internet, Exam Guide

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19 October 2000

1 Intellectual Property

1.1 Flavors of Protection

- Copyright
- Patents
- Trade Secrets

1.2 Trade Secrets

- One way to stop other people from misappropriating your ideas is to keep them secret
- Technically difficult—reverse engineering
- No real general legal protection
- Non-disclosure agreements
- May be appropriate at some stages
 - e.g. when seeking industrial backing for patent application

1.3 Copyright (in general)

- For protecting literary or artistic works
- Also covers music, recording, film, video, performances, broadcasts, etc.
- Applies to “derivative” works, such as translations
- Also covers compilations, arrangements (when non-trivial work involved)
- Originally for life-time of author, then extended to 50 years, now 70—why?
- Pressure from vested interests to extend further

- e.g. Disney and Mickey Mouse
- What social benefit?
- “Buying eternity on the installment plan” (Stallman)

- Once copyright expires, work becomes in public domain
 - e.g. Project Gutenberg
 - cheap literary classics in paperback
- Claiming copyright
 - used to require registration (e.g. Library of Congress in U.S.)
 - then just copyright notice
 - now just publication in some form, copyright claim assumed by default
 - * though copyright notice doesn’t hurt
- Pragmatic considerations: for example, in Australia
 - “fair dealing” provisions
 - recording off air for personal use (tax on blank media)
 - right to make backup copies
 - limited right to reverse engineer
- Variation across countries, but Berne Convention
- Both criminal and civil sanctions
- Copyright may be signed over to other parties (e.g. publishers)
- Special considerations for work done as an employee or government worker or contractor
- “Creator’s Rights”

1.4 Patents

- To protect innovative devices and processes
- Doesn't apply to discovery of natural laws, hence not to mathematical formulas, hence not to algorithms (see later)
- Difficult issues about biotechnology, patenting bits of genes, or whole organisms
- In return for disclosure (part of application process) inventor gets exclusive rights, generally for 20 or 21 years from granting of patent
- When patent expires, idea becomes in public domain
 - e.g. IBM's 1978 patent on arithmetic coding, used in compression (JPEG images, for one)
- Everybody wins
 - Inventor benefits either from royalties or deal with some company
 - Society gets the benefit of the invention, eventually for free
- Expensive
 - involved legal process
 - generally, must file separately in each jurisdiction
- Patenting is incompatible with trade secret

1.5 Important Calibration Points

Copyright and Patents (IP rights in general)

- Are *not* a divine right of authors or inventors...
- ... *but* are a limited right, granted by society...
- ... as incentive to creators, to encourage the development and spread of innovations beneficial to society at large.
- Vested interests, e.g. publishing houses, record companies, software producers, would like us to believe otherwise.

- Legal IP protection is a trade-off, balancing benefits/losses to various parties...
- ... depends on current technology and social structures
 - Former time: copyright restrictions really only affected owners of printing presses or record presses—no real negative effect on ordinary citizens, only benefits (publication)
 - Now, in age of cheap CD burners and Net connections: copyright restrictions do infringe “rights” of ordinary citizens...
 - ... different trade-off
 - micro-payments?

1.6 Intellectual Property Protection (IPP) for Software

- Copyright applies to source programs...
- ... and to executables (as translations)
- Legal rights to make backup copies and (under certain circumstances) reverse engineer, decompile (in certain jurisdictions, like Australia)
- Software in itself can't be patented (nor even the algorithm behind it)...
- ... however, a process can be patented that includes software as a component
 - at least in the U.S.
 - position in Australia is unclear
- “Look and Feel”—design of user interfaces
- “Clean Room” development—avoiding copyright contagion

1.7 Software IPP—Summary

- Copyright is easy to get, lasts a long time, but doesn't stop someone else from re-implementing your bright idea
- A software patent protects your bright idea, but is difficult to obtain (if you can at all)
 - That it lasts only around 20 years probably isn't a major consideration for software

1.8 “Traditional” Software Distribution

- Author (or more likely software house) holds copyright
- They grant you the right to use the software, in return for
 1. money
 2. your legally binding agreement to certain restrictive conditions...
 3. ...most significant: no further redistribution
- You don't buy the software, but a limited licence to use the software
- Note some rights are guaranteed by legislation (at least in Australia), like backup copies, limited decompilation
- Vendors may also use other mechanisms to restrict further distribution, like copy-protection schemes, authentication codes
- Licence may include other provisions, like limitations of liability
- Also, shareware, trial copies, demonstration copies

1.9 Free Software Movement/Open Source

- Much of Unix “owned” by AT&T
- Richard Stallman (emacs), GNU (“GNU is Not Unix”) Create a “Unix” unencumbered by AT&T copyright restrictions
- Created FSF (“Free Software Foundation”), core of whole Free Software Movement
- GPL—GNU Public Licence
- Mainly a collection of Unix utility replacements, until Linus Torvalds wrote a kernel (1992) that caught on—Linux
- Many other developers chose to distribute under GPL

- Social equity/accessibility for disadvantaged, e.g. ComputerBank

1.10 GNU Public Licence

- If it's “free”, why do you need a licence?
- GPL'd software is *not* in public domain
- GPL enforces (inter alia)
 - provision of source code
 - no restrictions on further distribution
 - “GPL propagation”
- Also separate GNU Licence for libraries
- Does not prohibit charging money for media and act of transferring software
- “Free” means free redistribution, not zero dollars
- *The Cathedral and the Bazaar*

1.11 Making Money out of Free Software

- Software distribution charges
 - buy CD versus hours of download time
- Books
- Training courses
- Consultancy, troubleshooting, installation services
- Coffee mugs, T-shirts... :-)
- Anthropological slant: kudos, “gift culture”
- Alternative model for software economy
- Quality of software from being open to scrutiny, rapid response to changes
- e.g. Netscape release of Navigator source

2 History of the Internet

2.1 Origins

- (1962) J.C.R. Licklider, MIT, “Galactic Network” concept
Became head of computer research at (D)ARPA, (Defense) Advanced Research Projects Agency
- Packet switching:
 - packet switching instead of circuits
 - (1961–67) MIT: Leonard Kleinrock, Larry Roberts,...
 - (1962–1965) RAND: Paul Baran, ... (military/voice)
 - (1964–1967) NPL (National Physics Lab, UK) Donald Davies and Roger Scantlebury
- (1965) First wide-area network: TX-2 in Massachusetts via phone to Q-32 in California

2.2 ARPANET

- (1966–67) Roberts/ARPA plans for ARPANET
- (1968) BBN (Bolt, Beranek and Neuman) gets ARPA contract to build IMPs (Interface Message Processors) (Bob Kahn)
- (1969) Initial ARPANET, four nodes
 - UCLA, Kleinrock
 - SRI, Doug Engelbart
 - UC Santa Barbara
 - University of Utah, Ivan Sutherland
 - last two, 3D graphics
 - network and use
- (1969) First RFC, Request For Comment
- (1971) 15 nodes (23 hosts), incl. MIT, Stanford
- (1970-72) NCP, Network Control Protocol—more hosts

- (1971) First network email (Ray Tomlinson, BBN)
(1972) modified for ARPANET @, Roberts’s mail manager
by 1973 is 75% of traffic
- (1972, Kahn) public demonstration at International Computer Communication Conference
- (1971–73) telnet, ftp, Network Voice Protocol
- (1973) First international connections, England and Norway

2.3 Interneting

- heterogeneous networks: original ARPA land-line packet network, packet radio (e.g. ALOHAnet), satellite
- open network architecture (Kahn, 1972)
- reliable end-to-end communication across networks
- (1972-1973) Kahn, Vinton Cerf work on what was to become TCP/IP, to overcome limitations of NCP

2.4 TCP, Transport Control Protocol

- virtual circuit
- many characteristics: reliable end-to-end data stream, flow control, fragments, routing,...
- UDP, User Datagram Protocol added, mainly for voice
- implementations through 70s, including BSD (very important for spread of Internet)
- (1980-82) Adopted as military standard
- (1982) Definition of “Internet” as using TCP/IP
- (1983) ARPANET switches over completely to TCP/IP

2.5 Internet Developments

- Originally separate:
 - (1979) USENET (UUCP 1976) “Poor man’s ARPANET”/News
 - (1981) CSNET (ARPANET gateway 1983)
 - (1981) BITNET (City University of New York)
- 1983 MILNET (military) splits off from ARPANET (research)
- 1983 Ethernet, Xerox PARC
- (1983–84) domain-name servers
- (1986) NSFNET backbone network (56Kbps)
- (1986) Internet Engineering Task Force
- (1990) End of ARPANET
- (1990-92) Archie, Gopher, WAIS, WWW
- Internet now ubiquitous
- Soon: IPv6:
 - 128-bit addresses,
 - quality of service, etc.

2.6 Australian Developments

- mid 1970s: limited direct dialup to ARPANET
- from mid 1970s:
 - ACSnet (“.oz domain”) Robert Elz/Melbourne, Bob Kummerfeld, Piers Lander/Sydney)
 - CSIROnet
- early 1980s: permanent email connection to ARPANET
 - before then, weekly tape on a plane
- 1984: top-level domain .au (Elz)
- 1989: real Internet connection: satellite link, University of Hawaii to University of Melbourne

- 1989–90: beginnings AARNet, Australian Academic and Research Network
- 1992: First commercial ISP, connect.com.au on AARNet
- mid 1990s on: increasing commercialization, e.g. float of .com.au registry

3 Exam Notes

3.1 Expectations

- You’ve listened intelligently in lectures
- You’ve taken your own notes, backed up by lecture slides provided on-line
- You’ve done the assigned reading, from *Green Book* and handouts
- You know main import and issues of each article:
 - e.g. for von Neuman EDVAC paper
 - * don’t expect you to give divider circuit diagram
 - * do expect you to know concepts and reasons: von Neuman architecture, serial processing,...
 - Study-guide section of *Green Book*
- You’ve looked at linked resources on WWW for background and re-inforcement
 - e.g. for CSIRAC
 - * expect you to know what I covered in lectures
 - * reading CSIRAC web pages will support that

3.2 What You Should Know

- Some basic facts essential, e.g.:
 - important contributors, who they were, what they did
 - technologies
 - approximate chronology
 - provides vocabulary and framework

- Understand:
 - concepts
 - inter-relations
 - reasons
 - implications
- “Those who do not learn from history are doomed to repeat it”
 - questions that haven’t already been answered elsewhere (newsgroup, webpages, lectures)
 - newsgroup over mail

3.3 Exam

- standard closed-book exam, 3h for CSE3323, 2h for CSE3230
- Questions (5 or 6) and parts (2 or 3 each)
- Write answer *legibly* in space provided, overflow to back of sheet only if necessary
- 70 marks total, values indicated
 - CSE3230 still worth 70 marks, but fewer parts with more marks and “lighter weight” for same marks
- Most parts will need a few sentences, maybe a couple of paragraphs to answer
- More interested in probing your awareness and understanding of the issues than in getting some fixed answer
- Answer the question
- Give your reasons where appropriate
- Partial answers will get proper partial marks
- Answer adequately, but avoid excessive length
- May require drawing together different topics, may draw on common knowledge
 - e.g. timesharing and ISPs

3.4 Consultation

- usual consultation time today (19 October)
- newsgroup daily till Monday
- priority