Combating Software Piracy: A Statutory Proposal to Strengthen Software Copyright

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COMMENT

COMBATING SOFTWARE PIRACY:
A STATUTORY PROPOSAL TO
STRENGHTEN SOFTWARE COPYRIGHT

> The restriction is confined to the specific form, to the collocation devised,
> . . . but . . . if it was to be protected at all, that collocation would be
> protected according to what was its *essence*. One would expect the pro-
> tection to be coextensive not only with the invention, . . . but with the
> possibility of reproducing the result which gives to the invention its meaning
> and worth.[1]

INTRODUCTION

Our legal system has not kept pace with the needs of the computer software
industry.[2] There has been no adequate statutory or common law response to
the need for legal protection of software innovations.[3] The absence of an

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1. White-Smith Music Publishing Co. v. Apollo Co., 209 U.S. 1, 19 (1908) (Holmes, J.,
concurring) (emphasis added).

2. K. PAVITT, THE CONDITIONS FOR SUCCESS IN TECHNOLOGICAL INNOVATION 22 (1971); *see
also* J. WALLACE, UNDERSTANDING SOFTWARE LAW 3 (1984) ("the law typically takes five to
twenty years to catch up to new technological developments"); *Law Plays Catch-Up in Computer
Rush,* Chi. Tribune, Feb. 28, 1985, § 3, at 9, col. 5 (quoting several computer law experts and
attorneys affiliated with the 950-member Computer Law Association). The Chicago Tribune
article emphasizes the response of the legal profession in meeting the challenges of new
technology: "Nationwide, law firms and law schools are recognizing that the spread of computers
through the business world is creating hundreds of novel legal situations that demand the
attention of lawyers with experience in computer-related matters." *Id.* See also Blodgett, *Bar
Committees Jump Into Computer Law,* 10 B. LEADER 28 (1985) (detailing the number of new
computer law committees and subcommittees formed by state and local bar associations).

John Naisbitt, author of the best-seller MEGATRENDS, argues that the legal profession will
be called on to resolve disputes and quarrels in a society of advanced information technology.
He notes that computers present novel questions for our legal system: "We are only now
beginning to sense the complications for a society inundated with computerized electronic
wizardry." Naisbitt, *Megatrends For Lawyers and Clients,* A.B.A. J., June 1984, at 45-46.
This theme is echoed in a recent issue of the A.B.A. Section on Litigation's publication,
Litigation News, which noted the relationship between law and intellectual property in a service-
based economy: "For, as our society becomes more service-oriented, so the need to protect the
products of the mind becomes increasingly significant to our economy." West, *Intellectual
Property Spawns Litigation Explosion,* LITIGATION NEWS, Spring 1985, at 1.

3. One commentator noted the clouded state of computer law:
   In spite of this heightened focus on software protection, intellectual property law
   protecting computer programs is a topic characterized by many unanswered ques-
   tions . . . . The legal structure surrounding software has not, however, kept pace
   with the technological changes occurring within the computer industry. Although
   there is voluminous material on the legal protection of software, no definitive legal
   principles have emerged concerning the procedures used to protect software.
J. SOMA, COMPUTER TECHNOLOGY AND THE LAW 21 (1983).

effective legal response has left the software industry vulnerable to pirating,[4] thus restricting the development of new programs. The high demand for software, combined with the ease of piracy, stimulates a high volume of software theft.[5] According to one estimate, there are as many as twenty unauthorized copies of software programs for every authorized copy.[6] Piracy cuts deeply into software revenues[7] and therefore discourages investment in the software industry.[8]

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4. This article adopts the general practice of using the term "pirate" to refer to individuals who steal a work by either direct or indirect copying in violation of the original owner's rights.

The piracy problem takes several forms. Competing software developers appropriate the creative product of others and create rival programs. "Private" pirates make copies of software programs and sell ("bootleg") or exchange the unauthorized copies. Finally, software can be pirated when a purchaser "leases" the program for a fraction of its fair cost to third parties who copy the program. For a discussion of piracy issues, *see* E. KEET, PREVENTING PIRACY: BUSINESS GUIDE TO SOFTWARE PROTECTION (1985); F. NEITZ, SOFTWARE LAW PRIMER (1984); Tangorra, *The Fight Against Software Piracy,* Publishers Weekly, Aug. 24, 1984, at 34; Note, *Software Piracy and the Personal Computer: Is the 1980 Software Copyright Act Effective?* 4 COMPUTER L.J. 171, 174-75 (1983); *Software Rentals: Piracy is the Hot New Issue,* BUS. WK. Aug. 1, 1983, at 90-91 (discussing software value and financial threat of illegal copying through rentals); *Crackdown On Computer Capers,* TIME, Feb. 8, 1982, at 60-61.

5. Goldschmitt, *Thou Shalt Not Dupe,* COMPUTERWORLD, Jan. 28, 1985, at 51. The author cites the work of the Association of Data Processing Service Organizations (ADAPSO), an organization that represents more than 750 corporate members and provides a wide spectrum of computer services. ADAPSO has begun a major educational campaign to confront the software theft problem. ADAPSO will circulate more than 60,000 educational brochures to end users, data processing professionals, corporate legal counsel, educational institutions, and U.S. corporate presidents, urging them to adopt a software protection policy statement. *See* Note, *supra* note 4, at 172 ("the relatively low risk of penalty [has] created a powerful incentive to steal other people's work . . . . [T]here are few practical or legal barriers inhibiting or preventing a 'pirate' from copying a computer program."); *see also* MacGrady, *Protection of Computer Software—An Update and Practical Synthesis,* 20 HOUS. L. REV. 1033, 1037 (1983) (most discussion in this area has been academic, "leaving no practical advice for the software owner"); Ortner, *Current Trends in Software Protection—A Litigation Perspective,* 25 JURIMETRICS J. 319 (1985).

6. Sterne & Saidman, *Copying Mass-Marketed Software,* BYTE, Feb. 1985, at 387. This article, written by computer law practitioners, presents an overview of recent lawsuits filed by Lotus, Inc. for copyright infringement against alleged pirates. A survey conducted by Future Computing, Inc., published on January 17, 1985, characterizes Sterne & Saidman's estimate as "conservative." Future Computing "believes that there is one pirated copy of business software in use for every copy authorized by the publisher." Goldschmitt, *supra* note 5, at 51 (citing the Future Computing survey). Some software market researchers believe that "as many as nine bootleg copies are in use for each legitimate disk." Wall St. J., Feb. 7, 1986, § 2, at 17, col. 3.

7. Goldschmitt, *supra* note 5, at 52. *See also Politics & Policy: Pirates at Bay,* FORTUNE, Jan. 21, 1985, at 83, 84 (four billion dollars estimated lost to piracy); Wall. St. J., *supra* note 6 (software producers outraged "because they believe that pirates are costing them millions of dollars in lost revenues).

8. NAT'L COMM'N ON NEW TECHNOLOGICAL USES OF COPYRIGHT WORKS, FINAL REPORT 11 (1979) [hereinafter cited as CONTU]. Potential returns on a good programming system are promising. *See Software Rentals: Piracy is the Hot New Issue, supra* note 4, at 90. However, the process requires a significant investment of human intellectual skills. *See, e.g.,* M. BRAUNSTEIN, ECONOMICS OF PROPERTY RIGHTS AS APPLIED TO COMPUTER SOFTWARE AND DATA BASES

This Comment discusses alternative remedies for computer piracy. The first section presents a survey of computer technology, emphasizing the uniqueness of software as intellectual property. The second section sets out the principles of patent and trade secret protection, two commonly suggested legal remedies for piracy, and concludes that these protections are inadequate for mass marketed software. The third section analyzes the nature of copyright protection, with an emphasis on the current uncertainties in the area of software protection. This Comment concludes by proposing reforms in copyright law that place software developers on an equal footing with other copyright owners. This proposal also stands the best chance of stemming computer piracy.

I. COMPUTER HISTORY AND TECHNOLOGY

Software sales are becoming an important part of the American economy. The personal computer market has grown since its origin in the mid-1970's into a seventeen billion dollar industry,[9] with expectations of vast future growth.[10] Consumer demand for software has also expanded at a remarkable

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11 (1981), *reprinted in* 4 Copyright, Congress, and Technology: The Public Record I (N. Henry ed. 1980) (software development characterized by heavy costs incurred in the development stage). One commentator notes that the long process of creating software is more like engineering than art: a process of problem or project definition, followed by designing the product (the program), creating a prototype (writing the source code), testing the product (debugging), and ultimately realizing a commercially marketable product. Davidson, *Protecting Computer Software: A Comprehensive Analysis,* 23 JURIMETRICS J. 339, 342 (1983). It has been estimated that development costs for each program average between $50,000 and $200,000. J. GEMIGNANI, LAW AND THE COMPUTER 81 (1981).

Like any other business decision, the decision to develop a computer program depends upon the potential return on the investment. J. MILLER, INTERMEDIATE MICROECONOMICS: THEORY, ISSUES AND APPLICATIONS 304 (1978). Developers must also take into consideration the absence of adequate legal protection afforded software. Comment, *Copyright Protection of Systems Control Software Stored in Read Only Memory Chips: Into the World of Gulliver's Travels,* 33 BUFFALO L. REV. 193, 195 (1984) (availability and extent of protection "will substantially affect the national computer market, including both large companies and individual consumers"). Indeed, judicial rulings and legislative enactments regarding the extent of protection may govern the long-term price, availability, quality, and form of software for both business and individual users. *See also* D. BROOKS, PROTECTING, ACQUIRING AND MARKETING COMPUTER SOFTWARE FOR THE MASS MARKET 18-19 (1982) (software houses and vendors of independently created software seek assurances of a means of recovering and profiting from their investment).

9. *Perspectives on the 1984 U.S. Personal Computer Market,* OFFICE VIEWS, Dec. 1984, at 2. *See also 1984 in Review,* FUTURE VIEWS, Jan. 1985, at 2-4 (a newsletter of Future Computing Incorporated, a Dallas-based research company catering strictly to the computer industry) (annual expenditures on U.S. personal computer market has tripled since 1981); *To Each His Own Computer,* NEWSWEEK, Feb. 22, 1982, at 50 (between 1976, the first year personal computers were sold, and 1981, an estimated $1.5 billion in computers were sold).

10. Although specific projections of growth in the computer industry vary, estimates range from $53 billion in 1989, see FUTURE VIEWS, *supra* note 9, at 2, to $150 billion in 1994, *see* INTERNATIONAL BUSINESS MACHINES CORP., 1984 ANNUAL REPORT 2 (1985).

The popularity of the personal computer is due in part to its wide range of available uses.

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rate. In the past, hardware-related products accounted for most of the computer industry's revenues.[11] Today, software sales are leading the computer industry;[12] sales of software are expected to equal, and eventually surpass, sales of hardware by the mid-1990's.[13] The software industry provides excellent opportunities for start-up companies because of the ease with which an individual or group can successfully develop new products.[14] Computer software developers now enjoy a broad-based and continuously expanding market for their products.[15]

To appreciate the significance of this new industry to the legal profession, it is first necessary to understand what software is. Computer technology is

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See Sci. Am., Sept. 1982 (documenting the role of computers in such areas as design, marketing, and commerce). *See also Machine of the Year,* Time, Jan. 3, 1983, at 15 (describing achievements of modern computer technology and many ways that computers improve our lives). The sharp decline in the cost of computer systems, concurrent with an increase in their speed and power, is another major factor in the rise in computer use: "The most startling change in computer system technology has been the dramatic decrease of hardware cost by a factor of 2 every two to three years since 1945." P. Wegner, Introduction and Overview, Research Directions in Software Technology 3 (1980). *See also* F. Harold, Introduction to Computers 46 (1984) (trends of increasing speed and accuracy, and diminishing size and cost, make computers useful for businesses and individuals).

11. Future Views, *supra* note 9, at 3.

12. *See* Wall St. J., Oct. 10, 1985, at 6, col. 1 (one bright spot in presently stagnate computer market is software sales).

13. Future Views, *supra* note 9, at 3.

14. R. Levering, M. Katz, & M. Moskowitz, The Computer Entrepreneurs (1984). The authors describe and profile the phenomenal growth of the personal computer industry, emphasizing the incredible opportunities which exist:

> In the course of a few short years, the personal computer ushered in a Gold Rush unlike any other in the history of American business. Companies were formed— and fortunes created—with incredible speed. Apple Computer made the Fortune 500 roster in less than five years after its birth in a Silicon Valley garage. No company had ever achieved that before. And while it took McDonalds 15 years to get to the $1 billion sales mark, ComputerLand stores accomplished it in only 8.

Id. at 2.

Furthermore, new entrants into the software industry greatly exceed new entrants into the hardware market. The software industry is characterized by low capital costs, and allows smaller, more flexible developers to move quickly to fill a market need when a gap occurs. *See* Dvorak, *Formula for Software Success,* Infoworld, Dec. 10, 1984, at 76. In addition to the formation of new software companies by entrepeneurs, the financial markets have recently placed high values on software. The ADAPSO/Broadview Index, an industry measure, announced that software mergers and acquisitions hit record highs in 1985, when over 200 software companies either merged or were acquired, a figure up 42% over 1984. Wall St. J., Jan. 23 1986, § 1, at 1, col. 5 (concluding that the flurry of activity is a healthy sign on interest in the software industry by outside companies).

15. Note, *The Policy Implications of Granting Patent Protection to Computer Software: An Economic Analysis,* 37 Vand. L. Rev. 147, 148 (1984). *See also* R. Baker, Scuttle the Computer Pirates 129-31 (1984) (mass-marketed microcomputer software sold in substantially higher volume when both hardware and software were sold or "bundled" in same product line).

made up of two principal components: hardware[16] and software.[17] Hardware

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16. *See infra* notes 18-22 and accompanying text. *See also* J. ADAMS & D. HADEN, COM-
PUTERS: APPRECIATION, APPLICATIONS, IMPLICATIONS 242 (1973); G. DAVIS, INTRODUCTION TO
ELECTRONIC COMPUTERS 5 (1973); J. SOMA, *supra* note 3, at 20 ("hardware" generally refers
to electrical machinery of computer); Maggs, *Some Problems of Legal Protection of Programs
for Microcomputer Control Systems,* 1979 U. ILL. L.F. 453.

All modern computers have roots in the early works of mathematicians and inventors. The
algebra of logic by George Boole, the punched card by Herman Hollerith, and the calculator
built by George Aiken represent several important prior developments. Also of great historical
importance was the work of Charles Babbage in the early 1800's. Babbage's technological
description of an analytical engine, which would execute an arbitrary sequence of operations,
and had internal data storage, is remarkably close to the basic idea of modern computers.

The first machine to resemble modern computers was the Electronic Numerical Integrator
and Calculator (ENIAC). Used mainly for calculating tables, the ENIAC used electronic
components but had no internal memory. The first computer to store instructions internally in
digital form was the Electronic Discrete Variable Automatic Computer (EDVAC). EDVAC was
unique because it used binary numbers for electronic arithmetic operations. The binary number
system contains only two digits, "0" and "1." A series of these digits are combined to instruct
the computer in an almost infinite variety of commands. The "0" represents a switch in open
or false position, and "1" represents a switch in the closed or true position. *See* J. SOMA,
supra note 3, at 23.

As hardware developed, the computer industry labelled the various stages of advancement.
Computers built during the 1950's used vacuum tubes and were identified as first generation
computers. Second generation computers were characterized by the use of transistors in place
of vacuum tubes. The transistor required less power, was smaller and less expensive, generated
very little heat, and generally made the computer more reliable. Third generation computers
were identified by integrated circuits, their orientation to data communication, and their ability
to handle multiple operations simultaneously. J. SOMA, *supra* note 3, at 23.

Fourth generation computers are termed "very large-scale integrated" computers (VLSI),
or supercomputer systems. All fourth generation computers are composed of a central processor,
a memory, an arithmetic unit, and input-output devices. We are currently at the intersection
between the third and fourth generations of computers. E. FEIGENBAUM & P. McCORDUCK,
THE FIFTH GENERATION, ARTIFICIAL INTELLIGENCE AND JAPAN'S COMPUTER CHALLENGE TO THE
WORLD 15 (1984); G. DAVIS, *supra,* at 9.

17. Since software refers to the instruction sequence that is necessary to bring about a
certain result, the term "software" is used synonomously with "computer program." Congress
adopted such a definition of software in an amendment to the Copyright Act: "A 'computer
program' is a set of statements or instructions to be used directly or indirectly in a computer
in order to bring about a certain result." Act of Dec. 12, 1980, Pub. L. No. 96-517, 94 Stat.
3015, 3028 (1980) (amending 17 U.S.C. §§ 101, 117).

The first software systems were packages of machine language subroutines that made
programming more convenient by providing a source of "canned" programs for input-output
and for common numerical calculations. Machine language, the first and most rudimentary
programming language, consisted of a combination of binary digits. Data and instructions were
represented in binary form, yet the specific combinations were unique because every computer
had its own machine language that could not be transferred to another type of computer.
Coding programs in machine language was a laborious and expensive process because of the
detail required. F. HAROLD, *supra* note 10, at 224.

Subsequent software developers concentrated on developing better programming languages.
Assember language, which used one assember instruction to specify one machine operation in
object code, was developed for many early computers. Assember languages were efficient in

is the physical or machine aspect of the computer system. There are four functional components of computer hardware: input,[18] control and logic,[19] memory,[20] and output.[21] These physical components combine to perform a countless variety of functions. The hardware is the framework within which various functions of the computer take place.[22] To function, however, the

terms of storage space and processing time, yet still required a high level of skill to program effectively. J. SOMA, *supra* note 3, at 42. In the late 1950's, the development of algorithmic programming language, which used specific procedure-oriented mnemonic codes, increased rapidly. Important languages that developed during this period include FORTRAN (1958), ALGOL (1959), and COBOL (1960). F. HAROLD, *supra* note 10, at 224-25.

As computer technology advanced and became more sophisticated, software played an increasingly important role in expanding the use and application of the computer. The current trend is toward software costs becoming a major percentage of total system costs. Hence, software becomes more important to the industry and society as a whole. FUTURE VIEWS, *supra* note 9, at 3.

18. *See* F. HAROLD, *supra* note 10, at 83-93. Input hardware usually consists of key punches, key-to-tape or key-to-disk, character recognition, and on-line data collection devices such as terminals and data processing equipment. Input has traditionally been a bottleneck in computer systems, causing a major portion of both time and error problems.

19. *See* F. HAROLD, *supra* note 10, at 104-06. The control and logic components make up what is generally called the central processing unit (CPU). The control and logic functions, along with the main memory, which is either directly attached to or located within the CPU, perform most of the data manipulation. Processing raw data, to convert it to meaningful information, may require arithmetic computations, logical operations, and movement of data to appropriate locations. The CPU performs all of these operations.

20. *See* J. SOMA, *supra* note 3, at 29. Memory may exist in several forms: tape devices, disk drives, or integrated circuitry. Typically, tape or disk drives are used to store machine readable data that can be organized and processed in sequence. The computer communicates the results of the data processing information to the user. Such feedback from the computer to user is known as output.

21. *See* F. HAROLD, *supra* note 10, at 152-54. Output hardware is often integrated with input hardware. The product of the CPU may be stored on disk or tape and simultaneously routed to a line printer (hard copy), cathode ray tube (CRT), or video display terminal (VDT) (soft copy) for review by the individual using the computer. Historically, the process of computer output has been slow compared with the speed at which the CPU can process data. The reason for both slow input and slow output is the mechanization of the equipment used during the process.

22. J. SOMA, *supra* note 3, at 22. There are two types of hardware: analog computers and digital computers. Analog computers represent information in continuous form. G. DAVIS, *supra* note 16, at 6. An example of a representation of information in continuous form is a thermometer. No matter where the mercury appears along the temperature scale, it represents a definite value. The bead of mercury is able to represent an infinite set of values, regardless of its position on the scale. Analog computers represent data by measuring physical or electrical quantities on a graduated scale. The analog computer then converts the physical quantity into a symbolic representation that is the measure of that quantity. Numeric results are obtained indirectly, and thus analog computers are both more cumbersome and inaccurate, and are better suited for controlling continuing processes, like oil refining or rubber synthesis. *See* F. HAROLD, *supra* note 10, at 59-60.

Digital computers, on the other hand, represent information in discrete form. An example of the representation of information in discrete form is an abacus. The beads in an abacus can

hardware requires instructions. Software systems,[23] commonly referred to as computer programs, are the sets of instructions that control the mechanical hardware operations. The term "computer software" is difficult to define in a legal sense.[24] Lawyers' lack of understanding of fundamental software concepts has led to confusion about the legal protection that should be afforded to computer software.[25] An accurate understanding of software technology is essential to an analysis of the legal protection software should be given.

There are two competing perspectives on the nature of software. Software is understood by some to be a simple set of instructions that operate a computer system.[26] From this perspective, a computer system is limited by

only be in an up or down position. If the bead is anywhere in the middle of the bar it has no value. Digital computers, using the more flexible discrete form binary notation system, may be applied for a variety of specific purposes and are, therefore, widely used in business, science, and personal applications. Today, digital computers comprise over 95% of computer systems. *See* R. GEORGE, COMPUTERS, SCIENCE AND TECHNOLOGY 17 (1970). In fact, most literature on computers assumes that the discussion involves only digital computers. The reasons for the dominance of digital computers include: 1) problems that can be solved on analog can also be solved on digital computers, but the reverse, in general, is not true; and 2) an analog computer requires an understanding of calculus, while a digital computer can be used and understood without any special mathematical background. G. DAVIS, *supra* note 16, at 11-12. These factors reflect the fact that digital computers are easier to use and to program.

23. *See* Pope & Pope, *Protection of Proprietary Interests in Computer Software,* 30 ALA. L. REV. 527 (1979).

24. *See* Keplinger, *Computer Software—Its Nature and Its Protection,* 30 EMORY L.J. 483, 484 (1981).

25. Caswell, *The Classification of Software: A Logical and Rational Approach,* 24 JURI-METRICS J. 377, 380 (1984). In a cogent analysis of definitional issues involving software, one commentator concluded:

> Current legal treatment of software is inconsistent at best, and irrational at worst. As each individual area of the law addresses the applicable software issues, the concept of software is twisted and manipulated to fit into a current regulatory framework that may be inadequate for the new technology. Concepts are further contorted by the countervailing and contradictory incentives offered by the regulations in different areas of the law. When the judicial system then becomes embroiled in software issues, the inadequacies of lawyers and the courts in dealing with computer software only further confuse the situation.

Id. at 395. Moreover, an article in a computer trade journal noted: "The inability to deal with fundamental software concepts has been reflected in much legislation and in many court decisions. The results have been inconsistent at best." Dakin & Higgins, *Fingerprinting a Program,* DATAMATION, April 1982, at 133-34.

26. In the early years of computer science, the programming of a computer was closely tied to the specific structure of the computer system and the functional task required. Most programs were custom engineered for each application. *See* Caswell, *supra* note 25, at 381; J. SOMA, *supra* note 3, at 21. The set of instructions or line-by-line commands are given in specific order, where each line provides a separate command to the computer. The importance of the "set of instructions" is shown in a common definition of a computer program: "a detailed set of instructions telling the computer what types of input data it will receive, exactly what operations to perform on it and in what order, and what type of output." M. HARRIS, INTRODUCTION TO DATA PROCESSING: A SELF-TEACHING GUIDE 300 (1979).

the hardware's physical capabilities and the instruction set provided by the software.[27] Because computer performance is dictated by a set of programmed instructions,[28] software is an integral component of the computer system without any separate existence. This view of software, however, is outdated because it is based on the operation of the large, clumsy analog computers of the past.[29]

The second view of software more accurately reflects current computer technology. Under this perspective, software is a separate, interchangeable embodiment of logic derived from a human designer's ideas.[30] Until recently, most software was custom-produced by only a few companies and was sold under contracts that prohibited purchasers from copying the programs. While some software is still custom designed for special applications, most software sales today are made to the mass consumer market.[31] Under the modern view, software is a valuable product because it operates independently of any particular computer.[32] It is produced apart from the hardware,[33] marketed separately from hardware systems, and created independently in many cases by software houses.[34] Most software is also multi-compatible or transportable,[35] which expands the number of specific uses for computers. Hence,

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27. *See* Caswell, *supra* note 25, at 381; Root, *Protecting Computer Software in the '80s: Practical Guidelines for Evolving Needs,* 8 RUTGERS J. COMPUTERS, TECH. & L. 205, 209 (1981).

28. For example, the size of the memory limits the range of complex functions that the computer can process. Memory is expressed as a measure of "bits" of machine-readable words. The memory capacity is typically cited as a quantity of 1000 bits or "kilobytes." *See* T. BARTEE, DIGITAL COMPUTER FUNDAMENTALS 48 (5th ed. 1981).

29. *See supra* note 22 (explaining difference between digital and analog computers).

30. *See* Rauzino, *Conversations with an Intelligent Chaos,* DATAMATION, May 1982, at 130-136; *see also* Bing, *New Technology and the Law: Likely Impact and Future Trends,* COMPUTERS & LAW, Feb. 1983, at 6 (mass-marketed software is an independent embodiment of structured human logic).

31. *See* D. BROOKS & M. KEPLINGER, SOFTWARE PROTECTION 241 (1982); Comment, *Copyright Protection of Computer Program Object Code,* 96 HARV. L. REV. 1723 (1983); Johnson, *Copyright Protection for Computer Flow Logic and Algorithms,* 5 COMPUTER L.J. 257 (1984).

32. *See* Caswell, *supra* note 25, at 382; *see also* Christo, *The Law and DP: A Clash of Egos,* DATAMATION, Sept. 1982, at 265 (this view of software represents current technological understanding and evidences current legal problems).

33. *See* Root, *supra* note 27, at 207: "[a] primary characteristic shared by all software is that it is separable from the hardware, so that different software can be used on the same machine to solve different problems."

34. *See* Bing, *supra* note 30, at 5 (legal constructs must change to reflect reality that software has a separate marketability and creation than hardware).

35. Caswell, *supra* note 25, at 381 n.19:

> Transportable software is software that can be used on a variety of machines or operating systems with little or no modification. Thus, a transportable software program in, for example, BASIC could be used on several of the many personal or home computers, which support BASIC. The primary advantage to transportability is that one piece of software can become operational on many different computers without any reprogramming or other transformation that might create what could be viewed as a separate product. Since the software can run on any

computer software is viewed as a separate physical embodiment of a structured logic derived from the human developers' thoughts, concepts, and ideas.

A software product also represents the logic and ideas of its developer. The computer performs tasks, directed by the program, which resemble the routine logic occurring in the human mind.[36] The computer's rapid use of logical sequences expands and accelerates human thought processes.[37] This view of software technology is consistent with the developing technology of artificial intelligence—the projected ability of computers to learn and think without human participation.[38]

The two competing views on the nature of computer software have produced confusion about the legal protection that software should be given. If software is defined as a component of the computer, inseparable from the hardware, then the software itself need not be legally protected. If software is defined as an independent product, created and marketed separately from the computer system, then a system of independent legal protection for software is warranted. Although software technology has progressed so that software is now a valuable product in its own right, current legal protection of software presumes the outdated view of the technology. The legal protection for software based on the older view is anachronistic and should be reformed.[39]

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computer, software and hardware should not be deemed to be a single unitary product.

36. Gemignani, *Computers and the Law—Pandora's Proverbial Box*, 25 RES GESTAE 758, 762 (1982); Comment, *The Nature and Taxability of Computer Software*, 22 WASHBURN L.J. 103, 105 (1982).

37. Caswell, *supra* note 25, at 383. For a discussion of the symbolic nature of programming in relation to legal protection, see J. LAUTSCH, AMERICAN STANDARD HANDBOOK OF SOFTWARE LAW § 3 (1985).

38. Roberts, *To Teach a Machine*, TECH. REV., Jan. 1982, at 23, 24. Mr. Roberts argues that current computers mimic the logical processes of the left side of the brain, and that future developments need only to subsume the right side functions of association, inference, and extrapolation. The article predicts that one day the computer may be the intellectual equal of man. Another important future prediction of software technology is automated programming, in which a computer writes programs by itself. *See* Lerner, *Automating Programming*, 182 I.E.E.E. SPECTRUM, Aug. 1982, at 28.

39. There are two broad categories of computer software: operating system programs and applications programs. Operating systems programs internally control the routine electromagnetic operations of the computer. C. SIPPL & R. SIPPL, COMPUTER DICTIONARY AND HANDBOOK 423-24 (3d ed. 1980). Operating systems programs provide the "[p]lans or instructions for controlling input/output operations, remote data transmissions, and multiple users which can be used and reused to control these operations." Application programs direct computer systems to perform specific particularized tasks. Application programs are more important to computer users because of their utilitarian function: to provide instructions that solve particular problems. This Comment will focus on application programs, which are the most important commercial software products.

40. One commentator has stated that "'Firmware' is a term of art in the computer industry, and refers to micro-instructions permanently embodied in hardware elements." Mantle, *Trade Secret and Copyright Protection of Computer Software*, 4 COMPUTER L.J. 669 n.1 (1984).

Finally, beyond traditional software there is a new programming technology in the computer field called "firmware."[40] Firmware defies definition as either software or hardware. Firmware is composed of integrated circuit chips, which are solid units about the size of a fingernail that are often made of silicon, into which active or passive components are integrated.[41] These chips may be integrated into the computer's circuit boards.[42] Firmware can function like software in a computer. It is often used to store computer instructions and information. A program can be embodied in permanent or semi-permanent form in the integrated circuit chip.

There are several different types of firmware chips. A "Read Only Memory" (ROM) chip stores electronically coded, machine readable words.[43] These machine readable words are often a set of instructions which are permanently encoded into the ROM chip and which can only be read, not erased or rewritten.[44] A variation of the ROM is the Progammable Read Only Memory chip (PROM), which can be used to permanently store desired programs.[45] An Erasable Programmable Read Only Memory chip (EPROM) can be erased and rewritten upon.[46] Finally, chips may have Random Access Memory (RAM), a function that allows an operator to read and operate user programs in storage while the main program is in use.[47]

II. ALTERNATIVE APPROACHES FOR PROTECTING SOFTWARE

Although this article focuses primarily on copyright protection of computer programs, software developers have traditionally pursued two other forms of intellectual property protection: patent and trade secret law.[48] This section

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41. *See* Ross, *Patentability of Computer Firmware,* 59 J. PAT. OFF. SOC'Y 731, 736 (1977).

42. *See* G. DAVIS, *supra* note 16, at 28.

43. *See* M. KRUTZ, MICROPROCESSORS AND LOGIC DESIGN 5 (1980).

44. *See* T. BARTEE, *supra* note 28, at 336.

45. *See* F. HAROLD, *supra* note 10, at 39-40.

46. *Id.*

47. *See id.* at 390. The advent of RAM chips is a recent advance in data storage technology. Because RAM chips are the only type of memory device that can approximate the speed of a microprocessor chip, data input is much quicker with RAM chips than with disk drives or optical disks.

48. Another avenue of protection for intellectual property is the common law concept of misappropriation, which is a "safety net" equity theory that governs wrongful appropriation of intellectual property. *See, e.g.,* E. KINTNER & J. LAHR, AN INTELLECTUAL PROPERTY LAW PRIMER 3 (1982). Common law misappropriation remedies evolved in response to unfair trade practices regarding traditional media. In practice, however, misappropriation was not applicable to computer software litigation. In the only case which appears to address the issue, Videotronics, Inc. v. Bend Elect., 26 PAT. TRADEMARK & COPYRIGHT J. (BNA) No. 636, at 196 (June 30, 1983), the plaintiff, a developer of a video game program, sought relief under both copyright and state common law doctrines. The federal court, however, explicitly stated that "because . . . the plaintiff's property interest in the computer program contained in its electronic video device is covered under the Copyright Act, relief under the state common law doctrines of

reviews the application of patent and trade secret law to mass-marketed software and criticizes the use of these approaches as being inadequate to protect modern software technology.

A. Patent Protection

The Constitution grants Congress the power "[t]o 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."[49] Under this grant of authority, Congress enacted patent laws to protect an inventor's monopoly over the profitable use of a salable device.[50] The Patent

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priation and trade secret cannot be obtained here." *Id.* at 197.

Most uncertainty about the applicability of state common law misappropriation results from the possibility that federal statutory protection schemes preempt state common law remedies. Until the United States Supreme Court addresses the preemption issue, it will remain unresolved. *See, e.g.,* Hoehling v. Universal City Studios, Inc., 618 F.2d 972 (2d Cir. 1980) (preemption of "fact" protection); Harper & Row Publishers, Inc. v. Nation Enter., Inc., 501 F. Supp. 848 (S.D.N.Y. 1980) (preemption of conversion claim); Avco Corp. v. Precision Air Parts, Inc., 210 U.S.P.Q. 894 (M.D. Ala. 1980) (trial court held that trade secrets claim equivalent to copyright under certain circumstances and therefore preempted), *aff'd on other grounds,* 676 F.2d 494 (11th Cir. 1982), *cert. denied,* 103 S. Ct. 827 (1983); Mitchell v. Penton Indus. Publishing Co., 486 F. Supp. 22 (N.D. Ohio 1979) (plaintiff's broad misappropriation claim preempted); Synercom Technology, Inc. v. University Computing Co., 474 F. Supp. 37 (N.D. Tex. 1979) (preemption). *But see* Feedman v. Select Information Sys., 221 U.S.P.Q. 848, 851 (N.D. Cal. 1983) (no preemption); Warrington Assocs. Inc. v. Real-Time Eng'g Sys. Inc., 522 F. Supp. 367, 368-69 (N.D. Ill. 1982) (no preemption); BPI Sys. Inc. v. Leith, 532 F. Supp. 208, 211 (W.D. Tex. 1981) (no preemption); Bromhall v. Rorvik, 478 F. Supp. 361 (E.D. Pa. 1979) (no preemption of "idea" protection).

Other commentators have discussed the preemption issue broadly. *See generally* Harris, *A Market-Oriented Approach to the Use of Trade Secret or Copyright Protection (Or Both?) for Software,* 25 JURIMETRICS J. 147 (1985); Kwall, *Copyright and the Moral Right: Is An American Marriage Possible?* 38 VAND. L. REV. 1 (1985) (providing an excellent analysis of the preemption issue generally, in the context of an argument for a merger between federal copyright law and the moral rights of creators); Mantle, *supra* note 40, at 669; Sadler, *Federal Copyright Protection and State Trade Secret Protection: The Case for Partial Preemption,* 33 AM. U.L. REV. 667 (1984); Comment, *Protection of Proprietary Rights in Computer Programs: A "Basic" Formula for Debugging the System,* 57 ST. JOHNS L. REV. 92 (1982).

In the patent area, preemption is well established. State unfair competition laws are preempted by federal "design patent" laws. Compco Corp. v. Day-Brite Lighting, Inc., 376 U.S. 234 (1964). State trade secret laws, however, are not preempted by federal patent laws. Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470 (1974).

49. U.S. CONST. art I, § 8, cl. 8.

50. The requirement that a patent applicant demonstrate that a claimed invention will potentially benefit society is consistent with the constitutional goal of "promot[ing] the Progress of Science." Patents, however, are legal monopolies and consequently are an exception to American society's general aversion to any form of unregulated monopoly power. For example, Thomas Jefferson, who generally opposed monopolies, supported the creation of legal monopolies through patent grants and drafted the first Patent Act. He gave the following reasons for his view: "Certainly an inventor ought to be allowed the right to the benefit of his invention for some certain time . . . . Nobody wishes more than I do that ingenuity should receive liberal

Act of 1952[51] requires that a claimed invention satisfy the requirements of subject matter, utility, novelty, and nonobviousness.[52]

Section 101[53] of the Patent Act contains the subject matter requirement: that an invention must be a new and useful process, machine, manufacture, or composition of matter in order to merit patent protection.[54] The United States Supreme Court interprets section 101 in a way that limits the protection that patent law can provide to computer programs.[55] Under the "mental steps" doctrine,[56] for example, a process such as a computer program that consists of steps which can be performed mentally is not patentable subject matter.[57]

The Court's principal patent decisions on software protection are difficult to reconcile. In *Gottschalk v. Benson,*[58] a 1972 case, the Court considered

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encouragement." 5 WRITINGS OF THOMAS JEFFERSON 75-76 (H. Washington ed. 1807), *cited in* Note, The *Policy Implications of Granting Patent Protection to Computer Software: An Economic Analysis,* 37 VAND. L. REV. 147, 162 (1984).

51. 35 U.S.C. §§ 1-376 (1982). This is the most recent and comprehensive patent legislation that Congress has passed. For a discussion of the 1952 Patent Act and subsequent changes, see Graham v. John Deere Co., 383 U.S. 1 (1965).

52. 35 U.S.C. §§ 101-103 (1982). For a more detailed discussion of the Patent Act's requirements of novelty, utility, and nonobviousness, see P. ROSENBERG, PATENT LAW FUN-DAMENTALS §§ 7.01-9.05 (2d ed. 1985).

53. 35 U.S.C. § 101 (1982). Section 101 states: "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." *Id.*

54. *Id.*

55. *See infra* text accompanying notes 58-61.

56. The mental steps doctrine holds that a process which can be broken down into a series of mental steps that can be performed in the mind is not patentable subject matter. *See In re* Abrams, 188 F.2d 165 (C.C.P.A. 1951). In 1966 the Patent and Trademark Office determined that computer programs were not proper subject matters for patent. 1968 OFFICIAL GUIDE PAT. OFFICE 829-30. In so concluding, the Patent Office relied on cases such as *Abrams.* One rationale for restricting the patentability of computer programs is that, since the degree of patent protection is very great, the requirements of patent eligibility for mental processes, ideas, logic, and scientific principles should be stringent in order to promote public access to these valuable concepts. P. ROSENBURG, *supra* note 52, at § 2A.

57. At one time, the Court of Custom and Patent Appeals rejected the doctrine as applied to computer programs. *See In re* Prater, 415 F.2d 1378 (C.C.P.A. 1968), *modified on rehearing,* 415 F.2d 1393 (C.C.P.A. 1969). In *Prater,* the court held that the patent eligibility of a process was not destroyed merely because the steps in the process could be performed by the human mind. *Id.* at 1389.

58. 409 U.S. 63 (1972). *Benson* is often cited for the proposition that ideas or mental processes are not patentable subject matter. *See, e.g.,* Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980) (court cites *Benson* for proposition that abstract ideas are not patentable); Parker v. Flook, 437 U.S. 584, 587 (1978) ("*Benson* applied the established rule that a law of nature cannot be the subject of a patent"). The *Benson* Court concluded that abstract intellectual concepts and mental processes, though newly discovered, were not patentable because they represent the "basic tools of scientific and technological work." 409 U.S. at 67. *See also* Rubber-Tip Pencil Co. v. Howard, 87 U.S (20 Wall.) 498, 507 (1876) ("[a]n idea of itself is

the patentability of a programming method, for general-purpose digital computers, to convert signals from binary-coded form to pure binary form.[59] By use of the mental steps doctrine, the Court equated the programming method with the underlying, unpatentable mathematical formula used to make the calculations.[60] The Court affirmed the denial of the plaintiff's patent request, and concluded that the program was not a patentable process under section 101 of the Patent Act.[61] In contrast to the *Benson* decision, the Court in *Diamond v. Diehr*[62] granted a patent on a computerized process for molding raw, uncured synthetic rubber into cured products.[63] While the *Diehr* opinion followed the *Benson* definition of software as an unpatentable algorithm, the Court viewed the innovation in this case to be an improved industrial process rather than a mathematical formula. When viewed in light of the *Benson* case, the *Diehr* decision suggests that processes that use computers may be patented, but that patent protection does not extend to software programs themselves.

The Court's understanding of software as the physical embodiment of algorithms underlies the Court's refusal to extend patent protection liberally to software.[64] Also, most software programs cannot satisfy the strict tests of nonobviousness and novelty required by sections 102 and 103 of the Patent Act.[65] Patent protection for computer programs is therefore limited

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not patentable"); LeRoy v. Tatham, 55 U.S. (14 How.) 156, 175 (1852) ("[a] principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right").

59. 409 U.S. at 65.

60. *Id.* at 69. This distinction between the underlying mathematical or scientific formula and the resultant product, calculation, or conclusion, has caused courts some confusion. "While a scientific truth, or the mathematical expression of it, is not [a] patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be." Mackay Radio & Tel. Co. v. Radio Corp., 306 U.S. 86, 94 (1939). Yet, the courts typically exclude scientific principles, laws of nature, ideas, and mental processes without defining these concepts. *In re* Meyer, 688 F.2d 789, 794 (C.C.P.A. 1982). One commentator concluded that "the distinction the Supreme Court has attempted to draw between patentable processes and mathematical algorithms is confusing and unnecessary," as well as "illogical and artificial." Gemignani, *Should Algorithms be Patentable?* 22 JURIMETRICS J. 326, 334-35 (1982).

61. 409 U.S. at 71-73. The Supreme Court reaffirmed *Benson* in Parker v. Flook, 437 U.S. 584 (1978). The applicant in *Flook* sought a patent for a computer program that used a previously undiscovered mathematical formula to calculate process variables and to update alarm units during catalytic conversion. The Court assumed that Flook's mathematical formula was the only novel portion of the process and denied the patent, concluding that the formula was an unpatentable discovery. *Id.* at 590.

62. 450 U.S. 175 (1981).

63. Respondent's process determined proper curing times by continuously measuring the temperature inside the curing press and repeatedly recalculating the remaining curing time. *Id.* at 178.

64. *See* Note, *supra* note 50, at 172; Allen, *The Patentability of Computer Programs: Merrill Lynch's Patent for Financial Services System,* 59 IND. L.J. 633, 641 (1984).

65. 35 U.S.C. §§ 102, 103 (1982). *See* MacGrady, *supra* note 5, at 1039-40.

under *Benson* and *Diehr* to programs that are part of processes that have traditionally been patentable.

Congress has given patent-like protection to firmware technology under the Semiconductor Chip Protection Act of 1984.[66] The Act extends protection to mask works,[67] and grants an owner exclusive rights to reproduce and distribute such works for a term of ten years.[68] Reverse engineering,[69] when used to teach or evaluate the concepts embodied in a mask work, is not considered an infringement of the owner's rights.[70] Because firmware is tangible, Congress was able to treat it like a patentable type of device. Yet, there continues to be no protection under current patent law for the large number of computer programs that are neither embodied in firmware nor related to a process of production.

B. *Trade Secret Protection*

Trade secret law originated from the common law tort of unfair competition, and is a product of the doctrines of property rights, contract rights, and confidential relationships.[71] The United States Supreme Court has observed that trade secret law[72] is intended to maintain the standards of

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66. 17 U.S.C. §§ 901-914 (1982). Section 901(a)(1) defines semiconductor chip products as the final or intermediate form of any product: "(A) having two or more layers of metallic, insulating, or semiconductor material, deposited or otherwise placed on, or etched away or otherwise removed from, a piece of semiconductor material in accordance with a predetermined pattern; and (B) intended to perform electronic circuitry functions."

67. Section 901(a)(2) defines "mask work" as a series of related images, however fixed or encoded: "(A) having or representing the predetermined, three-dimensional pattern of metallic, insulating, or semiconductor material present or removed from the layers of a semiconducto· chip product and (B) in which series the relation of the images to one another is that each image has the pattern of the surface of one form of the semiconductor chip product."

68. 17 U.S.C. §§ 903, 905 (1982). *See also* H.R. Rep. No. 781, 98th Cong., 2d Sess., *reprinted in* 1984 U.S. Code Cong. & Ad. News, 5750, 5767: "The owner of a mask work under the Act has the exclusive right to reproduce the work in any way, including any manufacturing method." The Semiconductor Chip Protection Act of 1984, 50 Fed. Reg. 263-73 (1985) (to be codified at 37 C.F.R. pt. 211)

69. Reverse engineering consists of the process of dismantling an object for the purpose of ascertaining and analyzing how it was manufactured or formulated. E. Kintner & J. Lahr, An Intellectual Property Law Primer 162-63 (1982); P. Rosenberg, *supra* note 52, at § 3.08.

70. 17 U.S.C. § 907 (1982).

71. Uniform Trade Secrets Act § 1(4) (1980):
(4) "Trade secret" means information including a formula, pattern, compilation, program, device, method, technique, or process, that:
(i) derives independent economic value, actual or potential, from not being generally known to, and being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use, and
(ii) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

72. Kewanee Oil Co. v Bicron Corp., 416 U.S. 470, 481 (1974).

commercial ethics and to encourage invention. The Restatement (First) of Torts devoted three sections to trade secret principles.[73] Supported by those sections, trade secret protection evolved in virtually every American jurisdiction.[74] Recently, the Commissioners on Uniform State Laws adopted the Uniform Trade Secrets Act.[75] The Uniform Act establishes the principles of common law trade secret protection, which had previously evolved unevenly among the states.[76]

The scope of trade secret protection is broad,[77] but several requirements must be met for trade secret status to accrue. The Restatement sets out six factors relevant to finding a trade secret,[78] but the essential elements are secrecy, novelty, and value;[79] secrecy is of prime importance.[80] A trade secret must be treated as a secret in-house and must be kept from competitors. With mass-marketed computer programs, the requirement of secrecy is dif-

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73. RESTATEMENT (FIRST) OF TORTS §§ 757-59 (1939).

74. 12 R. MILGRIM, BUSINESS ORGANIZATIONS, TRADE SECRETS § 2.01 (1967 & Supp. 1982). For an excellent monograph on trade secrets, see R. HOFER, CORPORATE PRACTICE SERIES PORTFOLIO ON TRADE SECRETS (1984).

75. UNIFORM TRADE SECRETS ACT (1980).

76. The Uniform Act has been enacted in nine states. See CAL. CIVIL CODE § 3426 (West 1985); CONN. GEN. STAT. ANN. § 35-50 (West Supp. 1985); DEL. CODE ANN. tit. 6, § 2001 (1974); IND. CODE ANN. § 24-2-3-1 (Burns 1984); KAN. STAT. ANN. § 60-3320 (1984); LA. REV. STAT. ANN. § 51:1431 (West 1985); MINN. STAT. ANN. § 325c.01 (West 1985); N.D. CENT. CODE § 47-25.1-01 to -08 (1983); WASH. REV. CODE ANN. § 19.108.910 (1985).

77. Comment, *Trade Secret Protection of Computer Software,* 5 COMPUTER L.J. 77, 78-79 (1984).

78. RESTATEMENT (FIRST) OF TORTS § 757, comment 6 (1939). The six factors are as follows:
1) External Secrecy—the extent to which the information is known outside the business;
2) Internal Secrecy—the extent to which it is known by employees and others involved in the business;
3) Security Measures—the extent of the measures taken to guard the secrecy of the information;
4) External Value—the value of the information to the business and to competitors;
5) Investment—amount of effort or money expended in developing the information; and
6) Accessibility—the ease or difficulty with which the information could be properly acquired or duplicated by others.

79. See R. MILGRIM, *supra* note 74, at §§ 2.01-.09; Comment, *supra* note 77, at 81-83.

80. Kewanee Oil Co. v Bicron Corp., 416 U.S. 470, 475 (1974). Several cases have ruled on trade secret protection in the computer area. See University Computing Co. v. Lykes-Youngstown Corp., 504 F.2d 518 (5th Cir. 1974) (restrictive use agreement preserved trade secret status of plaintiff's software system when abused by its joint venturer); Telex v. International Business Machs. Corp., 367 F. Supp. 258 (N.D. Okla. 1973) (IBM's elaborate in-house trade secret protection program met secrecy requirement), *aff'd in part & rev'd in part,* 510 F.2d 894 (10th Cir.), *cert. dismissed,* 423 U.S. 802 (1975); Com-Share Inc. v. Computer Complex, Inc., 338 F. Supp. 1229, 1234 (E.D. Mich. 1971) (trade secret existed based on evidence of plaintiff's security measures), *aff'd,* 458 F.2d 1341 (6th Cir. 1972).

ficult to meet.[81] Secrecy cannot practically be maintained if the software is marketed to the public. Although software secrecy can be maintained through restrictive use agreements and nondisclosure clauses in licensing contracts,[82] mass-marketed software users cannot be bound to such agreements as a practical matter when they purchase the software outright.

Apart from the uncomfortable fit between trade secret law and computer technology, efforts to maintain the secrecy of software can pose separate legal problems. For example, some courts and commentators suggest that efforts to hold software secrets may violate antitrust laws.[83] Another problem involves contract enforcement; adhesion contracts, which include some current license and "shrink wrap" agreements, may be void as unconscionable.[84]

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81. Maintaining secrecy can be an expensive effort because it involves complex procedures. *See* Gilburne & Johnston, *Trade Secret Protection for Software Generally and In the Mass Market,* 3 COMPUTER L.J. 211, 221-26 (1982) (discussing secrecy maintenance methods in detail, including physical control of work premises, equipment access security, employee confidentiality and non-disclosure agreements, use of license rather than sole agreements, and other restraints imposed on customers receiving copies of software).

82. *See* Murphy & Zuck, *Trade Secrets and Noncompetitive Agreements—Old Fashioned Remedies for Problems of High-Tech Industries,* 59 FLA. B.J. 37 (1985) (noting that agreements and non-disclosure clauses in licensing contracts are inadequate in light of practical enforcement problems).

83. *See* United States v. International Business Machs. Corp., 618 F.2d 923, 925 (2d Cir. 1980) (alleged illegal bundling of software to hardware; government charges that IBM's pricing and marketing policies created a lease-oriented environment that raised barriers to entry or expansion in the markets). *See also In Re* Data General, 734 F.2d 1336 (9th Cir. 1984) (defendant's use of copyrighted computer programs, and defendant's refusal to license the software except to purchasers of defendant's hardware, constituted an unlawful tying arrangement in violation of Sherman and Clayton Antitrust Acts); *IBM's Antitrust Troubles Are Not Finished Yet,* BUS. WK., Jan. 25, 1982, at 24 (European Community's antitrust commission charged IBM with abuse of market power in selling computers).

84. The issues surrounding shrink wrap licensing, where the terms and conditions of the lease are printed on the software product wrapper and are said to become effective and binding when the seal is broken, are important, yet unresolved. For a survey of the issues surrounding shrink wrap licenses, see Stern, *Shrink-Wrap Licenses of Mass Marketed Software: Enforceble Contracts or Whistling in the Dark?* 11 RUTG. COMPUTER & TECH. L.J. 51 (1985) (only solution to rental/piracy problem is Congressional action). Currently, only Louisiana has passed shrink wrap license enforcement legislation. *See* 28 PAT. TRADEMARK & COPYRIGHT J. [BNA] No. 693, at 466 (Aug. 23, 1984). Significantly, the Chicago Bar Association Computer Law Committee, through the Shrink-Wrap License Legislation Subcommittee, submitted a Software License Enforcement Act on March 28, 1985 (available from Jean M. Milligan, Chairperson, Gordon & Glickson, P.C.). Ultimately the Committee hopes to present the Act to the Illinois legislature. For an excellent discussion of all the issues raised by the shrink wrap law, identified through a detailed debate between attorney Gregory A. Cierlik defending the law and Illinois software developer Bruce Tonkin criticizing the law, see *Both Sides of the Shrink Wrap Law,* CHI. LAWYER, Nov. 1985 at 18.

Similarly, the question of whether shrink wrap agreements constitute unconscionable adhesion contracts remains unanswered. *See* Greguras, *Protecting Computer Software By Contract,* SOFTWARE PROTECTION, Oct. 1983, at 10; *see also* Note, *Copyright Infringement of Computer Programs: A Modification of the Substantial Similarity Test,* 68 MINN. L. REV. 1264 (1984) (advocating package inserts as the only practical manner of creating a contract for mass-marketed computer software). *See generally* E. FARNSWORTH & W. YOUNG, CONTRACTS 441-

Such uncertainties make trade secret protection an inadequate basis for software protection.[85]

III. COPYRIGHT PROTECTION

Copyright law is the most promising basis for protection of computer software.[86] Although copyright law offers better protection to software developers than the other alternatives, uncertainties about the status of computer software in copyright indicates a need for reform of current law. This section makes a chronological survey of the history of copyright law by highlighting the historical understanding of copyright as a law to protect expressions rather than ideas, and to protect only expressions that are humanly intelligible. As a result of these understandings, copyright law has inadequately served the needs of the software industry. This section also discusses recent efforts by Congress and the courts to apply copyright protection to computer software. As this discussion makes evident, these efforts have not addressed the core policies of copyright that are unfavorable to the protection of software.

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534 (1980) (contract of adhesion is a type of agreement that requires distinctive treatment because of inherent danger that one party may impose its will on an unwilling party).

85. *See* Soloman, *The Copyrightability of Computer Software Containing Trade Secrets,* 63 WASH. U.L.Q. 131, 152-53 (1985) (while software owner should seek federal copyright protection instead of relying on uncertain trade protection, even this combination does not provide "comprehensive legal coverage"). Similarly, a recent report by the Commission on New Technological Uses of Copyrighted Works (CONTU) noted several deficiencies of software trade secret protection. CONTU, *supra* note 8, at 17. First, trade secrets of general programs are not suited for mass distribution. Second, protection is lost if disclosure of the secret occurs. Third, substantial costs incurred to maintain a trade secret program increase the cost of software. Fourth, policy concerns mitigate against trade secrets because they impede the free exchange and development of ideas. Finally, the lack of uniformity in trade secret law leads to uncertainty. *Id.* at 19.

Despite these formidable barriers, however, trade secret is still the protection of choice for some computer program developers. This is due primarily to the fact that trade secret scheme protects a greater range of subject matter than either patent or copyright. But for the vast majority of developers who create application programs for mass distribution to the general public, trade secret protection is inadequate. *See* Solomon, *The Copyrightability of Computer Software Containing Trade Secrets,* 63 WASH. U.L.Q. 131, 152 (1985) (discussing the interplay between copyright and trade secret protection, suggesting that copyright protection fill more gaps than trade secret alone); Harris, *A Market-Oriented Approach to the Use of Trade Secret or Copyright Protection (or Both?) for Software,* 25 JURIMETRICS J. 147 (1985) (discussing advantages and disadvantages of trade secret and copyright).

86. *See, e.g.,* Rodau, *Protecting Computer Software: After* Apple Computer, Inc. v. Franklin Computer Corp., *714 F.2d 1240 (3d Cir. 1983), Does Copyright Provide the Best Protection?* 57 TEMP. L.Q. 527 (1984) (copyright law provides best currently available means of encouraging software development); Note, *supra* note 84, at 1264 ("software manufacturers are turning to the copyright laws for protection"); Note, *supra* note 4, at 171 (copyright is most appropriate protection for mass-marketed software, but trade secret may be more suitable for custom designed software); Note, Apple Computer Inc. v. Franklin Computer Corp. *Puts the Byte Back Into Copyright Protection for Computer Programs,* 14 GOLDEN GATE L. REV. 281 (1984) (as courts come to understand computer concepts, broad copyright protection for computer programs will be enforced).

A. History of Copyright

American copyright law is shaped by two interests that underlie the copyright system.[87] The first interest is that the copyright monopoly creates a financial incentive for people to produce intellectual works,[88] and production of these works promotes the public interest by advancing knowledge and culture. The second interest is that authors should be able to restrict dissemination and thus profit from their works.[89] The monopoly is regarded as providing just compensation for an author's labor to create an expression. The United States Constitution apparently resolves the tension between the two interests in favor of the public interest. The Constitution grants Congress the power "[t]o promote the Progress of Science and the useful Arts, by securing for limited times to Authors . . . the exclusive Right to their respective Writings."[90] The grant of Congressional power to provide intellectual property protection is prefaced by the statement that the purpose of the power is to promote and encourage progress in science and art. Thus, the Constitution supports the priority of the public good over the property right of the author.[91]

The United States Supreme Court first recognized the constitutional preference for the public interest in copyright law in the 1834 case of *Wheaton v. Peters.*[92] In *Wheaton,* the Court determined that copyright law was strictly a statutory creature, and not a common law property right or natural right of the author.[93] The Court viewed the copyright system as a statutory scheme

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87. *See* Abrams, *The Historic Foundation of American Copyright Law: Exploding the Myth of Common Law Copyright,* 29 WAYNE L. REV. 1119 (1983) (an excellent article on history of copyright system).

88. *Id.* at 1121 n.4 (citing Hurt & Schuchman, *The Economic Rationale of Copyright,* 56 AM. ECON. REV. 421 (1966)). *But see* W. BAUMOL, WELFARE ECONOMICS AND THE THEORY OF THE STATE 21 (1952) (proposing a theoretical framework where public goods should be produced either by publicly owned producers or by private producers who are totally subsidized by the government, financed through a general tax increase, and thus providing public goods free of charge and in sufficient quantity to satisfy demand at a zero price); Borcherding, *Competition, Exclusion and the Optimal Supply of Public Goods,* 21 J. LAW & ECON. 111 (1978) (discussing the distinction in economic theory between public and private goods).

89. *See* Abrams, *supra* note 87, at 1130. *Accord* Glove Newspaper Co. v. Walker, 210 U.S. 356 (1908); Bobbs-Merrill Co. v. Straus, 210 U.S. 339 (1908); Wheaton v. Peters, 33 U.S. (8 Pet.) 590 (1834).

90. U.S. CONST. art I, § 8, cl. 8.

91. *Id.*

92. 33 U.S. (8 Pet.) 590 (1834). One party in this case was Henry Wheaton, editor of an early Supreme Court reporter commonly known as "Wheaton's Reports." Wheaton had transferred his copyright in the volumes to the firm of Matthew Cady and Sons. The defendants in the case had published a series of volumes that reported the same opinions that appeared in the Wheaton series. Wheaton alleged that this series infringed his copyright; he sought an injunction. *Id.* at 594-95.

93. *Id.* at 661. *Accord* Caliga v. Inter Ocean Newspaper Co., 215 U.S. 182 (1909); Globe Newspaper Co. v. Walker, 210 U.S. 356 (1908); American Tobacco Co. v. Werckmeister, 207 U.S. 284 (1907); Holmes v. Hurst, 174 U.S. 82 (1899).

that gives authors adequate incentive to produce creative works, and provides the public with easy access to those works. The Court concluded that the protection of the author was subordinate to the public good.[94] Although this conclusion has been criticized,[95] the Court's public interest doctrine has remained an important factor in American copyright law to this day.[96] The doctrine continues to influence copyright case law as well.[97] Under the public interest doctrine, any attempt to expand or narrow the scope of copyright protection should be consistent with the traditional policy that favors the public interest over the property rights of the author.

B.   Traditional Elements of Copyright Protection

Only communications deemed "writings" are subject to copyright protection. The first federal copyright act protected only books, maps, and charts.[98] Technological advances, however, forced Congress to extend copyright protection to new forms of communication. Both Congress[99] and

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94. 33 U.S. (8 Pet.) at 661.

95. *See* E. DRONE, A TREATISE ON THE LAW OF PROPERTY IN INTELLECTUAL PRODUCTIONS IN GREAT BRITAIN AND THE UNITED STATES 1-53 (1879); 1 M. NIMMER, NIMMER ON COPYRIGHT §§ 4.02[C], 4.03 (1982) (*Wheaton* was incorrect in its conclusion that copyright was not recognized by common law as a natural right of the author); J. TAUBMAN, COPYRIGHT AND ANTITRUST 9 (1960). *See also Is Copyright Perpetual? An Examination of the Origin and Nature of Literary Property,* 10 AM. L. REV. 16 (1875) (literary property has its origin in natural law and not in legislation).

96. As stated in the Committee Report that accompanied the 1909 Copyright Act:

The enactment of copyright legislation by Congress under the terms of the Constitution is not based upon any natural right that the author has in his writings, . . . but upon the ground that the welfare of the public will be served and progress of science and useful arts will be promoted by securing to authors for limited. periods the exclusive rights to their writings . . . .

In enacting a copyright law Congress must consider . . . two questions: First, how much will the legislation stimulate the producer and so benefit the public, and, second, how much will the monopoly granted be detrimental to the public? The granting of such exclusive rights, under the proper terms and conditions, confers a benefit upon the public that outweighs the evils of the temporary monopoly.

H.R. REP. No. 2222, 60th Cong., 2d Sess. 7 (1909) (accompanying the Copyright Act of Mar. 4, 1909, ch. 320, 35 Stat. 1075) (codified as amended at 17 U.S.C. §§ 1-216 (1976) (repealed 1976)); *see also* STAFF OF HOUSE COMM. ON THE JUDICIARY, 87TH CONG., 1ST SESS., REPORT OF THE REGISTER OF COPYRIGHTS ON THE GENERAL REVISION OF THE U.S. COPYRIGHT LAW 5 (Comm. Print 1961): "As reflected in the Constitution, the ultimate purpose of copyright legislation is to foster the growth of learning and culture for the public welfare, and the grant of exclusive rights to authors for a limited time is a means to that end." This report began the legislative process which culminated in the 1976 Copyright Act.

97. *See* A & M Records, Inc. v. M.V.C. Distrib. Corp., 574 F.2d 312 (6th Cir. 1978); Pittsburgh Athletic Club v. KQV Broadcasting Co., 24 F. Supp. 490 (W.D. Pa. 1938).

98. Act of May 31, 1790, ch. 15, § 1, 1 Stat. 124 (codified at 17 U.S.C. §§ 102, 106 (1982)).

99. S. REP. No. 6187, 59th Cong., 2d Sess. 4 (1907): "The term used in the Constitution

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the courts[100] strained to construe the constitutional term "writing" broadly to protect new forms of expression.[101] For example, the Supreme Court recognized Congress' authority to copyright as "writings" such expressions as photographs,[102] motion pictures,[103] and sound recordings.[104] The current Copyright Act adopts an even broader construction of the term "writing," and extends copyright protection to "original works of authorship fixed in any tangible medium of expression . . . from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine device."[105] This broad definition of the term "writing" has helped expand copyright protection to encompass new creative mediums. Consequently, the term "writing" is not a formidable hurdle in applying copyright protection to software.[106]

Other conditions for copyright protection are even less stringent than the "writing" requirement. For example, copyrighted material must have an "author,"[107] a term that includes anybody to whom a work "owes its origin."[108] The definition is broad enough to apply to works created by a corporate entity or a group of individuals.[109] A copyrighted work must also be "original."[110] An original work, for copyright purposes, is one that is

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is 'writings.' But Congress has always construed this term broadly, and in doing so has been uniformly supported by judicial decision."

100. *See, e.g.,* Shaab v. Kleindienst, 345 F. Supp. 589, 590 (D.D.C. 1972) (per curiam): "The Copyright Clause of the Constitution must be interpreted broadly to provide protection for [the sound recording industry]."

101. *See generally* Comment, *Copyright Protection for Computer Programs,* 47 TENN. L. REV. 787, 793 (1980) (describing evolution of copyright and how law gradually adapted to new forms of expression consistent with development of emerging technologies).

102. Burrow-Giles Lithographic Co. v. Sarony, 111 U.S. 53 (1884).

103. Kalem Co. v. Harper Bros., 222 U.S. 55 (1911).

104. Goldstein v. California, 412 U.S. 546 (1973).

105. 17 U.S.C. § 102 (1982).

106. *See* H.R. REP. No. 1476, 94th Cong., 2d Sess. (1976), *reprinted in* 1976 U.S. CODE CONG. & AD. NEWS 5659.

107. 17 U.S.C. § 201 (1982).

108. Alfred Bell & Co. v. Catalda Fine Arts, Inc., 191 F.2d 99, 102 (2d Cir. 1951) (citing Burrow-Giles Lithographic Co. v. Sarony, 111 U.S. 53, 57-58 (1884)).

109. Such works are considered either "works made for hire" or "joint works." 17 U.S.C. § 201(a), (b) (1982). Although a copyright in a work vests in the author or authors of the work, in the case of a work made for hire, the employer or other person for whom the work was prepared is considered the author, and the copyright vests in the author, not the preparer. *See, e.g.,* Samet & Wells, Inc. v. Shalom Toy Co., Inc., 429 F. Supp. 895 (E.D.N.Y. 1977) (absent express contractual reservation of copyright in author, title to copyright is held by employer).

Similarly, joint authorship vests a copyright in each author. 17 U.S.C. § 201(a). *See also* Picture Music, Inc. v. Bourne, Inc., 314 F. Supp. 640 (S.D.N.Y.) (joint authorship of a single work, which traditionally contemplated collaboration and common purpose, gives rise to joint ownership of copyright), *aff'd,* 457 F.2d 1213 (2d Cir. 1970), *cert. denied,* 409 U.S. 997 (1972). For a good discussion of issues involved with hired software developers, see Conley & Bryan, *The Treatment of Computer Software Works Made for Hire,* 5 COMPUTER L.J. 579 (1985).

110. 17 U.S.C. § 102(a) (1982).

created independently by an author. The work need not be different from other works in the public domain,[111] and the concept of originality does not encompass intangible factors such as artistic merit.[112] Most works fulfill the writing, authorship, and originality requirements.

Because copyright is available for a broad spectrum of writings, courts have attempted to prevent undue extension of copyright protection by narrowly construing the law of copyright infringement.[113] The first major restriction on the scope of protection against infringement was developed by the Supreme Court in *Baker v. Selden.*[114] In *Baker,* the Court held that it was not copyright infringement for a person to use a system of accounting that was described in the plaintiff's copyrighted book. The Court determined that infringement occurs only when the expression of an idea is taken from a copyrighted work. There is no infringement, however, when the underlying idea is copied. This doctrine is labelled the "idea-expression dichotomy;" it is a guiding principle of copyright law.[115] The idea-expression dichotomy narrows the scope of copyright infringement. In particular, it limits protection of computer programs because software, as an expressive medium, merges an idea and an expression so that the two are coextensive.[116] Because the essence of software is in its underlying idea and logic, the idea-expression dichotomy effectively curtails copyright protection for computer software.

The Supreme Court also limited copyright protection in *White-Smith Music Publishing Co. v. Apollo Co.,*[117] a decision that authorized the production of copies of protected works when the copies are in a form not readable by humans. In *White-Smith,* a 1908 case, the Court held that a perforated

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111. *See, e.g.,* L. Batlin & Son, Inc. v. Snyder, 536 F.2d 486, 490 (2d Cir. 1976): "[O]riginality is . . . distinguished from novelty; there must be independent creation, but it need not be invention in the sense of striking uniqueness, ingeniousness, or novelty, since the Constitution differentiates 'authors' and their 'writings' from 'inventors' and their 'discoveries'." *See also* Universal Athletic Sales Co. v. Salkeld, 511 F.2d 904 (3d Cir.), *cert. denied,* 423 U.S. 863 (1975) (originality is not a prerequisite of copyright and a modicum of creativity may suffice for a work to be protected); Comment, *supra* note 101, at 796 (defining originality as independent creation, not novelty).

112. *See, e.g.,* Bleistein v. Donaldson Lithographing Co., 188 U.S. 239 (1903) (Congress intended the scope of the copyright statute to include more than traditional fine arts).

113. In order to succeed in a copyright infringement action, "plaintiffs must prove (1) that defendants copied from their works and (2) that such copying worked an unlawful appropriation of at least a substantial, protected part of the allegedly infringed work." Bevan v. Columbia Broadcasting System, Inc., 329 F. Supp. 601, 604 (S.D.N.Y. 1971).

114. 101 U.S. 99 (1879).

115. *See, e.g.,* Franklin Mint Corp. v. National Wildlife Art Exch. Inc., 575 F.2d 62, 64 (3d Cir.), *cert. denied,* 439 U.S. 880 (1978); Herbert Rosenthal Jewelry Corp. v. Kalpakian, 446 F.2d 738 (9th Cir. 1971); 1 M. NIMMER, *supra* note 95, at § 2.18.

116. Apple Computer, Inc. v. Franklin Computer Corp., 714 F.2d 1240, 1249 (3d Cir. 1983) (court required a showing that the underlying idea cannot be expressed in more than one way before the idea and expression of the idea will be considered merged). *But see* 1 M. NIMMER, *supra* note 95, at § 2.18[c][2].

117. 209 U.S. 1 (1908).

piano roll, which was used to reproduce the tones of a copyrighted musical composition, was not a "copy" under copyright law.[118] The Court held that the term "copy" only included works that were in a form that was humanly intelligible.[119] The copyright statute protected only tangible works, and not ideas, from publication and duplication.[120] The Court found that in the case of music publications, a plaintiff's copyright had been infringed only by the unauthorized publication of sheet music, and not by the production of the perforated piano roll.[121] The idea-expression dichotomy, combined with the rule that requires humanly intelligible copies to cause infringement,[122] limited the protection available under copyright law in this case.

These traditional doctrines of copyright law pose problems for the protection of computer software.[123] Although courts have extended copyright protection to expressions that are primarily of a communicative or expressive nature—art, literature, music, and audiovisual works—computer software is uniquely valuable as a tool comprised of logic, ideas, and concepts for use in solving problems.[124] The basic concepts of copyright infringement must be reformulated if copyright law is to encompass software.

C. *Reform of Copyright Law to Protect Software*

During the early stages of the computer era, the computer industry paid little attention to copyright protection.[125] The Copyright Office accepted the first request to register a program in 1964.[126] At the time, copyright law did not state whether a program constituted a "writing of an author" and whether reproduction of a program constituted "copying." The Copyright Office accepted the program for registration in accordance with its policy of resolving doubtful issues in favor of registration.[127] During the next fourteen years, only 1,205 programs were submitted for registration.[128]

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118. *Id.* at 17.

119. *Id.*

120. *Id.* at 11.

121. *Id.* at 18.

122. The requirement of humanly intelligible copies was overruled by § 102(a) of the current Copyright Act, which extends protection to forms "from which they can be perceived, reproduced, or otherwise communicated, either directly *or with the aid of a machine or device."* 17 U.S.C. § 102(a) (Supp. I 1983) (emphasis added).

123. *See* Caswell, *supra* note 25, at 391; J. WALLACE, *supra* note 2, at 4 (copyright protection was not initially appropriate for software protection).

124. *See supra* note 116 and accompanying text.

125. *See* Puckett, *The Limits of Copyright and Patent Protection for Computer Programs,* 16 COPYRIGHT L. SYMP. [ASCAP] 81 (1968).

126. United States Copyright Office, *Copyright Registration for Computer Programs, reprinted in* 11 BULL. COPYRIGHT SOC'Y 361 (1964).

127. *Id.* at 368.

128. CONTU, *supra* note 8, at 34. Over three-fourths of the 1,205 programs registered during this period were owned by the two largest hardware manufacturers, IBM and Burroughs Corporation. *Id.*

Two developments preceded the passage of significant computer software legislation. First, Congress revised the old copyright law with the 1976 Copyright Act.[129] The Act made few changes in the copyright status of computer software.[130] The Act did identify software as copyrightable subject matter; the category of "computer programs" was included among the list of protectable "literary works."[131] The Act also established that a machine reproduction of a computer program is a "copy."[132] Although Congress intended to protect computer programs through copyright by these amendments, the Act retained its strict adherence to the idea-expression dichotomy that denied copyright coverage to computer software in earlier times.[133]

The second development took place in 1974, when Congress established the National Commission on New Technological Uses of Copyrighted Works (CONTU).[134] Congress created CONTU to research, study, and recommend legislative changes related to computer programs, data bases, and other software matters. In its 1978 report,[135] the Commission unanimously agreed that a computer program in written form should be eligible for copyright protection. There was disagreement among the Commission members, however, about whether copyright protection should extend to programs published in object code form on punch cards, magnetic tape, or semi-conductor chips. The Commission majority concluded that such forms should receive protection because the different forms reflected differences only in storage media and not in the nature of the programs themselves.[136]

The CONTU majority reasoned that market realities—the growth of personal computers, the decline of programs tailored for single purpose ma-

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129. Act of Oct. 19, 1976, Pub. L. No. 94-553, 90 Stat. 2541 (codified at 17 U.S.C. § 101 (1982)). The Act eliminated common-law copyright, simplified copyright procedure, and rejected the distinction between the protection of published and unpublished works. *See* T. HARRIS, THE LEGAL GUIDE TO SOFTWARE PROTECTION 43-44 (1985).

130. 17 U.S.C. § 117 (1976) (repealed 1980). The Congressional Committee reports reflected a desire by the lawmakers to preserve the status quo while awaiting CONTU's recommendations. *See* H.R. REP. No. 1476, *supra* note 106, at 116; H.R. REP. No. 1733, 94th Cong., 2d Sess. 72 (1976), *reprinted in* 1976 U.S. CODE CONG. & AD. NEWS 5810, 5813.

131. H.R. REP. No. 1476, *supra* note 106, at 54: "The term 'literary works' . . . also includes computer data bases, and computer programs to the extent they incorporate authorship in the programmer's expression of ideas, as distinguished from the ideas themselves."

132. 17 U.S.C. § 102(a) (1982).

133. *Id.* § 102(b). Section 102 was added to ensure that "although the programmer's 'literary expression,' as embodied in a program, would be copyrightable, his ideas, system and methodology would not." U.S. COPYRIGHT OFFICE, GENERAL GUIDE TO THE COPYRIGHT ACT OF 1976, at 3:4 (1977).

134. Act of Dec. 31, 1974, Pub. L. No. 94-573, § 201, 88 Stat. 1873 (codified at 17 U.S.C. § 201 (1982)).

135. CONTU, *supra* note 8, at 13.

136. *Id.* at 10. The majority analogized computer storage media to magnetic tapes used to store music. The majority stated that both "are sets of information in a forum which, when passed over a magnetized head, cause minute currents to flow in such a way that desired physical work is accomplished." *Id.*

chines, and the emergence of independent software houses—made copyright a valuable means of protection.[137] The majority returned to the fundamental rationale of copyright, the public interest in progress and dissemination of the benefits of computer technology, as a justification for enhanced copyright protection of software. The CONTU majority recommended that the Copyright Act be amended to include computer programs as a proper subject matter of copyright, and to repeal section 117,[138] which expressly disaffirmed certain forms of copyright coverage for computer programs. CONTU also recommended that owners of copies of computer programs be permitted under copyright law to use or adapt copies for their use.[139]

D.   The Computer Software Copyright Act of 1980

Two years after receiving CONTU's report, Congress enacted the Computer Software Copyright Act of 1980.[140] Pursuant to CONTU's recommendations, the Act amended section 101 by adding the definition of a computer program to the list of existing statutory definitions.[141] Additionally, the Act replaced the old section 117 with a new section 117,[142] which contains

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137. *Id.* at 11.

138. 17 U.S.C. § 117 (1978) (repealed 1980). The law states in relevant part:
    Notwithstanding the provisions of sections 106 through 116 and 118, this title does not afford to the owner of copyright in a work any greater or lesser rights with respect to the use of a work in conjunction with automatic systems capable of storing, processing, retrieving, or transferring information, or in conjunction with any similar device, machine, or process, than those afforded to works under the law . . . .

139. CONTU, *supra* note 8, at 12. In a dissent, Commissioner Hersey disputed the Commission's final recommendations and challenged the appropriateness of using copyright law to protect computer programs. Hersey's dissent warned of the "subtle, dehumanizing danger" of the majority view. *Id.* at 27-37 (Hersey, C., dissenting). For a detailed article analyzing Commissioner Hersey's dissent, see Koenig, *Software Copyright: The Conflict Within CONTU,* 27 BULL. COPYRIGHT SOC'Y 340 (1980).

While Commissioner Melville Nimmer agreed with the majority's recommendations, he would limit copyrightability to programs that themselves produce copyrightable output. Thus, he would allow registration for programs which created data bases, managed a legal retrieval system, or played a computer game, but not for one which controlled the heating system in an apartment house. CONTU, *supra* note 8 at 26-27 (Nimmer, C., concurring).

140. Act of Dec. 12, 1980, Pub. L. No. 96-516, 94 Stat. 3015 (1980) (codified at 17 U.S.C. §§ 101, 116 (1982)).

141. 17 U.S.C. § 101 (1982): "A 'computer program' is a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result." *See* CONTU, *supra* note 8, at 26-37.

142. 17 U.S.C. § 117 (1982). The new § 117 provides:
    Limitations on exclusive rights: computer programs. Notwithstanding the provisions of section 106, it is not an infringement for the owner of a copy of a computer program to make or authorize the making of another copy or adaptation of that computer program provided:
    (1) that such a new copy or adaptation is created as an essential step in the

language that details the rights of owners of copies of computer software to copy or adapt these programs for their own use. Although the Act's legislative history is only contained in a short paragraph in a committee report,[143] the committee stated that the Act "embodies the recommendations of [CONTU] with respect to clarifying the law of copyright of computer software."[144] The CONTU report is therefore legitimate authority for interpreting the Act.

The computer industry was satisfied with most aspects of the new Act. Software producers were no longer subjected to section 117's non-committal stand on copyright protection for software.[145] The Act also provided a broad definition of "computer program,"[146] and the new section 117 clarified the rights of those who rightfully owned copies of computer programs. Owners now clearly had the right to make archival copies and to modify or adapt the program as needed for their own use.[147]

E. Judicial Decisions

Although computer software has been given copyright protection in various forms since 1964,[148] courts have struggled to apply copyright principles to computer software. Software copyright cases have shown that copyright common law rules do not apply to works, such as computer programs, that judges cannot understand. Courts must compare software products that are distinguishable only by non-obvious technical characteristics. The problem of the lack of technical experience is compounded when courts develop and apply tests that use indefinite standards.

One of the most difficult issues in software copyright law is whether object code is copyrightable. An object code is a program that consists of machine language instructions. Only trained systems analysts can comprehend these

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utilization of the computer program in conjunction with a machine and that it is used in no other manner, or

(2) that such new copy or adaptation is for archival purposes only and that all archival copies are destroyed in the event that continued possession of the computer program should cease to be rightful.

Any exact copies prepared in accordance with the provisions of this section may be leased, sold, or otherwise transferred, along with the copy from which such copies were prepared, only as part of the lease, sale, or other transfer of all rights in the program. Adaptations so prepared may be transferred only with the authorization of the copyright owner.

143. H.R. REP. No. 1307 (pt. 1), 96th Cong., 2d Sess. 23, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6460, 6482, 6483.

144. *Id.* For a discussion of the impact of the CONTU report and the extent of software copyright protection, see Wharton, *Use and Expression: The Scope of Copyright Protection for Computer Programs,* 5 COMPUTER L. REV. 433 (1985).

145. *See supra* note 125 at 89-90.

146. *See supra* note 141 and accompanying text.

147. 17 U.S.C. § 117(2) (1982); Michaelson & Einschlag, *Legal Defenses Against Piracy,* ELECTRONICS WEEK, Mar. 4, 1985, at 53 (software protection under current legal theories is "a forest of facts, fantasies, methods and results").

148. *See supra* notes 126-28 and accompanying text.

programs.[149] In 1982, the Third Circuit, in *Williams Electronics, Inc. v. Arctic International, Inc.,*[150] addressed the issue of whether an object code, embodied in an ROM, was copyrightable. In *Williams Electronics,* the plaintiffs sought to enjoin Arctic International from infringing on the plaintiff's copyrighted audiovisual works.[151] The defendant contended that, under the 1976 Copyright Act, the programs in question were not copyrightable because they did not meet the statutory requirement of fixation in a tangible form.[152] The defendant argued that copyright protection was not available for ROM chips because they were "utilitarian objects or machine parts."[153] The court rejected the defendant's argument, basing its decision on the wording of the 1976 Copyright Act.[154] The court concluded that the duplication of a copyrighted computer program embodied in an ROM chip amounted to copyright infringement.[155]

In *Apple Computer, Inc. v. Franklin Computer Corp.,*[156] the Third Circuit again addressed the issue of whether an object code embodied in an ROM chip could be protected by copyright. Apple Computer filed a suit alleging that Franklin Computer infringed Apple's copyrights. Franklin manufactured and marketed computers that used software developed for use with the popular Apple II computer. To assure that the Franklin software was compatible with the Apple, Franklin copied Apple's operating system computer programs.[157] A district court denied Apple's request to enjoin Franklin

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149. "Object code" is defined as a computer software program that consists of a sequence of machine language instructions. *See* Comment, *supra* note 31, at 1725. As such, object code is machine readable code and is directly intelligible to the computer. *Id.* For a discussionof the issues involved in copyright protection of object code, see Baldy, *Computer Copyright Law: An Emerging Form of Protection for Object Code Software After* Apple v. Franklin, 5 COMPUTER L.J. 233 (1984).

150. 685 F.2d 870 (3d Cir. 1982).

151. *Id.* at 871.

152. *Id.* at 873. Section 102 provides, in part:

(a) Copyright protection subsists . . . in original works of authorship *fixed in any tangible medium of expression,* now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device . . . .

17 U.S.C. § 102 (1982) (emphasis added). The fixation requirement is defined in § 101, in relevant part:

A work is "fixed" in a tangible medium of expression when its embodiment in a copy or phonorecord, by or under the authority of the author, is sufficiently permanent or stable to permit it to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration.

Id. § 101.

153. 685 F.2d at 874.

154. *Id.* at 877.

155. *Id.* The court affirmed the final injunction order enjoining the defendant from infringing plaintiff's copyrighted computer program and audiovisual works. The court remanded the case only as to the finding that the infringement was willful and deliberate. *Id.* at 878.

156. 714 F.2d 1240 (3d Cir. 1983), *cert. dismissed,* 104 S. Ct. 690 (1984).

157. *Id.* at 1245 (Franklin did not dispute that it copied Apple programs). Operating system computer programs generally manage the internal functions of the computer or facilitate the use of other programs. *Id.* at 1243.

from its infringment of Apple's copyright because under the 1976 Copyright Act it was unclear whether object code was copyrightable.[158]

The Court of Appeals for the Third Circuit reversed the district court and decided that an object code is copyrightable.[159] The court reviewed section 102, the CONTU report, and the legislative history of the 1980 Copyright Act. The court found that although section 102(a) did not expressly list computer programs as works of authorship, the history of the 1980 Copyright Act suggested that object codes should be considered copyrightable as literary works.[160] Moreover, the court held that the language of the 1980 Act made computer programs subject to copyright protection.[161]

The Third Circuit's contribution to computer copyright law in the *Apple Computer* decision was to distinguish between software products that can be copyrighted as the expression of an idea, and the idea behind a software program that is itself uncopyrightable. That is, when other programs can be written or created that perform the same function as the original program, the original program is the initial expression of the idea and thus subject to copyright.[162] This test, although theoretically elegant, is difficult to apply in practice because of the lack of objective standards that are necessary to protect the copyright owner from potential infringement. Courts that use the *Apple Computer* test will experience analytical difficulties in separating ideas from expressions; these difficulties will result in inconsistent decisions and uncertainty for software designers.

Another problem addressed by courts is the determination of what constitutes a substantially similar product in the context of computer software. A substantially similar product is one that, in "total concept and feel," resembles a protected product and therefore infringes the copyright.[163] The Seventh Circuit addressed the substantial similarity issue in *Atari, Inc. v. North American Philips Consumer Electronics Corp.*[164] In *Atari,* the plaintiff

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158. 545 F. Supp. 812, 825 (E.D. Pa.), *rev'd,* 714 F.2d 1240 (3d Cir.), *cert. dismissed,* 104 S. Ct. 690 (1984).

159. 714 F.2d at 1247-49. The court also reaffirmed its holding in *Williams* regarding the copyrightability of object code embodied in ROM chips.

160. *Id.*

161. *Id.* at 1249. A second issue addressed by the Third Circuit in *Franklin* was whether operating system programs were copyrightable. *Id.* at 1245. Franklin argued that operating system programs were not copyrightable because they were *per se* excluded from protection under both the express language of section 101(b) of the Copyright Act and Baker v. Selden, 101 U.S. 99 (1879). 714 F.2d at 1250. For a discussion of *Baker, see supra* notes 114-15 and accompanying text. Franklin argued that *Baker* constituted an "insuperable obstacle to the copyrightability of Apple's operating systems." 714 F.2d at 1251. The court rejected Franklin's arguments as inconsistent with the statutory language of § 101, which makes no distinction between application programs and operating systems. *Id.* at 1252.

162. 714 F.2d at 1253 (citing Morrissey v. Procter & Gamble Co., 379 F.2d 675, 678-79 (1st Cir. 1967)).

163. Roth Greeting Cards v. United Card Co., 429 F.2d 1106, 1110 (9th Cir. 1970).

164. 672 F.2d 607 (7th Cir.), *cert. denied,* 103 S. Ct. 176 (1982).

sued North American to enjoin it from marketing a video game, "K.C. Munchkin," which in many ways resembled Atari's product, "PAC-MAN." The court held that in order to determine whether the parties' products were substantially similar, it had to determine whether the defendant's work was so similar to the plaintiff's that a reasonable person would conclude that the defendant unlawfully appropriated a protected expression.[165] The court acknowledged that such a test was necessarily subjective.[166] After the court applied the test in the subject case, it held that Atari proved substantial similarity between its product and North American's.[167] This test, like the test devised in *Apple Computer,* suffers from a lack of definition and specificity. The test can lead to divergent results and uncertainty for software designers.[168]

A third software copyright problem, raised in the 1985 case of *SAS Institute, Inc. v. S & H Computer Systems, Inc.,*[169] is the determination of what constitutes a "derivative work" among computer programs. A derivative work is one that is "based upon one or more preexisting works," such as a translation, an annotation, or an editorial revision.[170] Such works, unless authorized by the holder of the protected work, are copyright infringements. The dispute in *SAS Institute* arose from a 1981 licensing agreement between the SAS Institute and S & H Computer Systems, under which S & H paid SAS Institute $4500 to lease its statistical analysis software. The licensing agreement stipulated that S & H was to use the SAS program on only one

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165. *Id.* at 614 (citing Scott v. WKJG Inc., 376 F.2d 467, 469 (7th Cir.), *cert. denied,* 389 U.S. 832 (1967)).

166. *Id.* at 615.

167. *Id.* at 617-19. The court stated: "Based on an ocular comparison of the two works, we conclude that plaintiffs clearly showed likelihood of success. Although not 'virtually identical' to PAC-MAN, K.C. Munchkin captures the 'total concept and feel' of and is substantially similar to PAC-MAN." *Id.* at 619.

168. For a comprehensive discussion of tests to determine infringement in computer software, see Note, *supra* note 84 (substantial similarity test is unworkable in computer software context; an iterative standard to determine infringement is more appropriate), and Perelman, *Proving Copyright Infringement of Computer Software: An Analytical Framework,* 18 Loy. L.A.L. Rev. 919 (1985).

169. 605 F. Supp. 816 (M.D. Tenn.), *appeal dismissed,* No. 83-5435 (6th Cir. Apr. 1, 1985) (available Aug. 24, 1985, on LEXIS, Genfed Library, Cases file). In another recent but less significant case, Whelan Assoc. v. Jaslow Dental Laboratory, Inc., 609 F. Supp. 1307 (E.D. Pa. 1985), the court addressed the issue of copyright infringement of a software program that had been translated from an EDL language version to a BASIC language version. The plaintiff alleged the the defendant's programmer used the EDL source code to arrive at a translation to BASIC language capable of running on IBM personal computers. The second version was virtually identical to the original in mode of operation and function performed. *Id.* at 1309-10. The court stated that the "expression of the idea embodied in a computer program is protected by the copyright laws even though it must be altered and refined . . . and require different source codes" to be used in another computer. The court concluded that the IBM version infringed on the earlier version even though it was not a literal copy. *Id.* at 1315.

170. 17 U.S.C. § 101 (1982).

specifically identified IBM computer located at Tennessee State University.[171] The court found that the licensing agreement prohibited S & H from further distribution of the program, from allowing timesharing use of the SAS program, and from making copies of SAS's program except for backup purposes.[172] The court noted that SAS invested approximately five years and more than eighteen man-years of labor into developing the program's source code.[173]

Notwithstanding the licensing agreement's limitations, a small group of Vanderbilt University faculty ignored the agreement and adapted the program for its own use.[174] The group also sold its adaptation of the program for profit.[175] Based on evidence produced at trial, the court concluded that S & H's purpose in licensing the program was to obtain SAS's source code for use in the preparation of its product.[176] The court found that S & H exploited the SAS source code[177] to develop its own program. Finally, the court held that S & H's use of the copyrighted SAS source code to develop the adapted program made the latter program a derivative work of the SAS product and therefore an infringement of SAS's copyright.[178]

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171. 605 F. Supp. at 821. In addition, the license agreement permitted S & H to modify the SAS program only for its own use, and to employ the program as part of an updated work. However, no redistribution of such an updated work was allowed. The license agreement also granted to S & H only those rights enumerated in the agreement. *Id.*

172. *Id.*

173. *Id.* at 818. According to the court:

> The source code for a computer program is the series of instructions to the computer for carrying out the various tasks which are performed by the program, expressed in a programming language which is easily comprehensible to appropriately trained human beings. The source code serves two functions. First, it can be treated as comparable to text material, and in that respect can be printed out, read and studied, and loaded into a computer's memory, in much the same way that documents are loaded into word processing equipment. Second, the source code can be used to cause the computer to execute the program. To accomplish this, the source code is "compiled." This involves an automatic process, performed by the computer under the control of a program called a "compiler," which translates the source code into "object code," which is very difficult to comprehend by human beings. The object code version of the program is then loaded into the computer's memory and causes the computer to carry out the program function.

Id.

174. *Id.* at 819. The court found that a former part-time Vanderbilt employee transferred to S & H, while three full-time faculty members formed a limited partnership in order to financially profit from the conversion scheme.

175. *Id.* at 820. The scheme consisted of a "Development Agreement" between the partnership and S & H to develop "a set of computer programs, which provide integrated statistical analysis similar to an existing statistical system known as SAS," after which the partnership would purchase the product for 114% of development costs. *Id.*

176. *Id.* at 820.

177. *Id.* at 822.

178. *Id.* at 829.

To determine whether S & H had "copied" the SAS source code, the court applied the standard of substantial similarity.[179] Through an examination of the evidence, the court concluded that the S & H program was substantially similar to that of SAS.[180] Since the S & H program fell within the definition of a derivative work[181] under section 101, the court found that S & H engaged in improper conduct in achieving its "conversion" of SAS.[182]

The court decided *SAS Institute* by use of traditional copyright principles because the facts of the case were simple and clear. Unfortunately, copyright infringement is not so easily determined in most computer software cases.[183] The *SAS Institute* decision is significant because it places emphasis on the actual use of a protected work to create a derivative work, rather than on the similarity of the two works in isolation from their development. The case therefore stands for the proposition that, in computer software copyright cases, the history of a work's development should be as closely scrutinized as the end product. Because the decision was dismissed on appeal,[184] *SAS Institute* is especially significant as it is the only case in a complex and uncertain area of litigation.[185]

F. Shortcomings of Present Copyright Protection

The Computer Software Copyright Act of 1980[186] clarifies the ground rules for software copyright protection. Commentators are dissatisfied with the

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179. *Id. See supra* notes 163-66 and accompanying text.

180. 605 F. Supp. at 830.

181. 17 U.S.C. § 101 (1982) states in part:

A "derivative work" is a work based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgement, condensation, or any other form in which a work may be recast, transformed, or adopted. A work consisting of editorial revisions, annotations, elaborations, or other modifications which, as a whole, represent an original work of authorship, is a "derivative work."

182. 605 F. Supp. at 830.

183. *See* Soocher, *Software-Infringement Ruling Prompts Debate,* NAT'L L.J., Apr. 22, 1985, at 11 (quoting J. Marcellino, attorney for Gaston Snow & Ely Bartlett, Washington, D.C.). Mr. Marcellino noted that courts approach infringement suits as "lay observer[s]" who determine whether there existed a substantial similarity between the works in dispute "at some frozen moment in time." *Id.* He noted, however, that with computer technology, "what was similar once can be made to look different five minutes later." *Id.*

184. SAS Institute, Inc. v. S & H Computer Systems, Inc., No. 83-5435 (6th Cir. Apr. 1, 1985) (available Aug. 24, 1985, on LEXIS, Genfed library, Cases file).

185. *See, e.g.,* Soocher, *supra* note 183, at 11. According to Mr. Soocher, some experts believe that the decision will help hundreds of plaintiffs to succeed in pending software copyright litigation, while other experts minimize the impact of the decision by describing it as merely an extension of the concept of derivative rights in intellectual property to software.

186. Act of Dec. 12, 1980, Pub L. No. 96-517, 94 Stat. 3015 (1980) (codified at 17 U.S.C. §§ 101, 117 (1982)).

new law,[187] however, and the computer industry still requires adequate legal protection for software.[188] An ideal copyright system for computer software would be one that meets the goals of both the government and the software industry. A balanced copyright law must provide software developers with strong remedies and effective procedures against infringement, while also encouraging the creation and distribution of beneficial technologies for the public good. Although copyright law adequately meets these needs for traditional media, the statute denies this protection to computer software. This section describes the statutory rights that are granted to copyright owners, and shows how the copyright statute, by balancing public good against private property interest, limits the copyright owner's rights. The section will then demonstrate how the Act fails to provide needed protection to the software industry.

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187. *See generally* Conley & Bryan, *A Unifying Theory for the Litigation of Computer Software Copyright Cases,* 6 COMPUTER L.J. 55 (1985) (pointing out uncertainty and confusion with applying traditional legal concepts to highly technological factual setting, and offering a new model for software copyright litigation); Kelso & Rebay, *Problems of Interpretation Under the 1980 Computer Amendment,* 23 SANTA CLARA L. REV. 1001 (1983) (elucidating general criticisms of the 1980 Act).

188. Association of Data Processing Serv. Org., ADAPSO newsletter, March 28, 1985. *See supra* note 5. ADAPSO spends a great deal of time combating the piracy problem for the entire software industry. The ADAPSO Software Piracy Committee has proposed meeting the problem on three fronts: (1) a public relations campaign to inform the public that unauthorized copying of software is theft; (2) technological key coding and sophisticated diskette-based encryption devices aimed at restricting user access or ability to copy; and (3) litigation and legislative action aimed at promoting stronger legal protection and effective enforcement. ADAPSO encourages cooperation and voluntary agreements between all software developers to effectuate these plans.

However, frustration among software developers continues. One computer industry magazine devoted an entire issue to widespread piracy problems. *Special Section: Software Piracy,* INFOWORLD, Mar. 22, 1982, at 31-47. Some developers have even gone so far as to loan their software to a customer, hoping only that if the customer is happy with the product, the customer will voluntarily pay a set fee. This concept, called "Shareware," depends upon a person's sense of honesty, and anticipates that the user will send in the payment to become a registered owner. Some schemes even encourage copying because the developer pays a sales commission when a copy is made for someone who also registers as an owner. *See A Better Way to Buy Software?* CHANGING TIMES, Mar., 1985, at 20.

Some commentators conclude that traditional intellectual property laws are so inadequate that a completely new form of protection is necessary to meet the needs of software developers. *See, e.g.,* Comment, *Softright, A Legislative Solution to the Problem of User's and Producers' Rights in Computer Software,* 44 LA. L. REV. 1413 (1984) (suggesting hybrid legislation "to tailor the law to the needs of programmers and developers, as well as users, to discourage unwarranted copying of software, and to make the enforcement of intellectual property rights in software a practical reality"). The article also discusses why people make unauthorized copies of software. *Id.* at 1450-54; *see also* Anderson, *Software Law: He's Forging a New Specialty Where Law, Technology Meet,* USA TODAY, Dec. 6, 1983, at 3B, col. 3 (calling for major revisions of all intellectual property protection schemes for software); Kelso & Rebay, *supra* note 187, at 1029.

The present copyright statute affords a copyright owner several specific and exclusive rights. Under section 106,[189] the copyright owner has the exclusive right to reproduce the copyrighted work,[190] prepare derivative works of the original,[191] and distribute copies by sale,[192] rental, or lease.[193] In some media forms, the copyright owner has the exclusive right to perform and display the work publicly.[194] Thus, section 106 delineates copyright owners' specific, exclusive rights, and any infringement constitutes a violation of those rights.

Such rights, however, are expressly limited by sections 107 through 118.[195] With the exception of section 117, these sections provide that some uses of copyrighted material are not an infringement. The rationale for limiting exclusive rights is the need for the general public to utilize copyrighted works in specific instances without the threat of infringement. The exceptions to exclusive rights are supposed to be narrow enough to prevent economic detriment to the copyright owner.[196] Thus, the copyright statute allows certain

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189. 17 U.S.C. § 106 (1982). Section 106 provides:

Subject to sections 107 through 118, the owner of copyright under this title has the exclusive rights to do and to authorize any of the following:

(1) to reproduce the copyrighted work in copies or phonorecords;

(2) to prepare derivative works based upon the copyrighted work;

(3) to distribute copies or phonorecords of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending;

(4) in the case of literary, musical, dramatic, and choreographic works, pantomimes, and motion pictures and other audiovisual works, to perform the copyrighted work publicly; and

(5) in the case of literary, musical, dramatic, and choreographic works, pantomimes, and pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audiovisual work, to display the copyrighted work publicly.

190. The exclusive right of reproduction is the true essense of copyright. *See, e.g.,* Granite Music Corp. v. United Artists, 532 F.2d 718 (9th Cir. 1976) (statutory copyright protects against unlawful reproduction of original work); Alfred Bell & Co. v. Cataldea Fine Arts, 191 F.2d 99 (2d Cir. 1951) (copyright confers an exclusive right to copy protected work and a right not to have others copy it).

191. For definition of derivative work see *supra* note 181. *See also* Atlas Mfg. Co. v. Street and Smith, 204 F. 398 (8th Cir.) (exclusive right of authors to dramatize and translate their copyrighted works is part of copyright itself), *cert. denied,* 231 U.S. 755 (1913).

192. Pellegrini v. Allegrini, 2 F.2d 610 (E.D. Pa. 1924) (copyright holder had exclusive right to sell copyrighted works).

193. Westway Theatre v. Twentieth Century-Fox Film Corp., 30 F. Supp. 830 (D. Md.) (legal effect of copyright is to create in owner an exclusive property right with incidental power to lease or license use by others), *aff'd,* 113 F.2d 932 (4th Cir. 1940).

194. Waring v. Dunlea, 26 F. Supp. 338 (E.D.N.C. 1939) (singers and actors have an exclusive right in their art and may prohibit an unauthorized public performance); *see also* Interstate Circuit, Inc. v. United States, 306 U.S. 208 (1939) (owners of copyrighted motion picture film have exclusive rights to exhibit it).

195. *See supra* note 189.

196. *See, e.g.,* 17 U.S.C. § 110 (4), (6) (1982). Section 110 states, in part: "and not for private financial gain . . . without any purpose of direct or indirect commercial advantage." *See also* H.R. REP. No. 1476, *supra* note 106, at 4 (provision expressly adopts the 'no profit motive' limitation).

infringements when the conduct is designed to promote greater public interest and not to economically benefit the infringer.

Section 107[197] is the paradigm model of the limitation sections. This section provides that portions of a copyrighted work may be copied for "fair use" in criticism, news reports, scholarship, and other related fields. Whether such use is "fair use" depends on three factors: whether the use was commercial or editorial, what the nature of the copyrighted work is, and how much of the work was copied. All subsequent sections follow section 107's inherent balancing concept by defining the circumstances under which a person has the right to use copyrighted material.

Such balancing is employed in copyright protection of computer software, though only in form. Protection of software, covered exclusively by section 117, is limited by that section's expansive exceptions to exclusive rights. The 1980 Copyright Act defines the unauthorized input of a work into a computer as an infringing act.[198] Section 117, however, incorporates major exceptions regarding what constitutes infringement of copyrighted computer programs.[199] Pursuant to the CONTU recommendations, section 117(1) now provides that it is not a copyright infringement "for the owner[200] of a copy of computer program to make or authorize the making of a copy."[201] The owner's right to freely transfer software presents a major problem in the context of mass-marketed computer software, because it encourages piracy.[202]

Section 117 also presently allows a non-copyright holder to copy a program if making the copy is an "essential step"[203] in the use of a program in conjunction with a machine. This exemption is broad; it legitimizes any use of a program remotely related to the user's subjective need of essential steps

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197. 17 U.S.C. § 107 (1982) provides:

> Notwithstanding the provisions of section 106, the fair use of a copyrighted work, including such use by reproduction in copies or phonorecords or by any other means specified by that section, for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright. In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include—
>
> (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
>
> (2) the nature of the copyrighted work;
>
> (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
>
> (4) the effect of the use upon the potential market for or value of the copyrighted work.

198. CONTU, *supra* note 8, at 12. *See also* 2 M. NIMMER, *supra* note 95, at § 8.08.

199. *See supra* note 142.

200. This was the only departure from the CONTU recommendations that refer to "the rightful processor." *See* CONTU, *supra* note 8, at 1.

201. 17 U.S.C. § 117(1) (1982) (footnote added).

202. *See supra* notes 4-7 and accompanying text; *see also* Wharton, *Use and Expression: The Scope of Copyright Protection for Computer Programs,* 5 COMPUTER L.J. 433 (1985) (analysis of copyright protection and unique nature of software copy).

203. 17 U.S.C. § 117(1) (1982).

in connection with the use of a program. With such discretion by the user, the software copyright owner has no control over the extent of the use or misuse of the work.[204] Section 117 is inconsistent with both the letter and the spirit of traditional copyright law.

IV. LEGISLATIVE PROPOSAL—CLOSING LOOPHOLES

The extent of uncertainty in the area of software protection is reflected in the high volume of litigation,[205] and the number of scholarly[206] and

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204. *See* Kelso & Rebay, *supra* note 187:
> The statute seems overly vague in regard to this problem. While the Commission indicates that the adaptation right 'could only be exercised so long as [it] did not form the interests of the copyright proprietor,' this apparently broad protection of the copyright owner's interest is not reflected in the language of the statute.

Id. at 1030 (citing CONTU, *supra* note 8, at 13).

205. *See, e.g.,* West, *supra* note 2, at 18-19 (software copyright is one of fastest growing areas of litigation, with a great deal of time spent on unresolved issues).

One expert in the computer litigation area, however, has stated that while many cases alleging violations of computer software protection are filed, few cases reach the trial stage because the parties are afraid to risk the uncertainties. Most cases are settled out of court, which has resulted in a paucity of case law in this area. Telephone interview with Robert Greene Sterne, of Saidman, Sterne, Kessler & Goldstein, Washington, D.C. (Feb. 15, 1985).

While domestic litigation over copyright protection of software continues, another area of uncertainty is the response of some countries in providing adequate international protection for computer programs. For an article sketching the issues and noting trends toward a worldwide copyright protection, see Siber, *The Worldwide Legal Status of Software Protection*, NAT. L.J., Jan. 21, 1985, at 20.

206. *See generally* D. BROOKS, COMPUTER LAW 342-76 (1985). A common scheme is to restrict distribution of programs to license instead of sale. This allows contractual control of the licensee in the form of conditional contracts, service contracts, and nondisclosure clauses. Under the service contract approach, the licensor promises to continually update and improve the software in exchange for the licensee's promise to restrict access. The conditional contract may provide for breach and remedy of liquidated damages upon the occurrence of an event, perhaps the vendees attempt to copy or break code.

Another approach advocated is the attempt to maintain concurrent trade secret and copyright protection. *See, e.g.,* Comment, *Simultaneous Copyright and Trade Secret Protection for Computer Programs*, 23 SANTA CLARA L. REV. 1037 (1983). While simultaneous copyright and trade secret protection increases the scope and degree of protection, it may be impossible if the two are deemed to be mutually exclusive by action of law (preemption) or physical impossibility. The latter may be true because the Copyright Act requires registration and thus under the Freedom of Information Act allows publication. *Id.* at 1045. Registration of the program may preclude trade secret remedies. Registering only object (machine readable) code may solve this problem. However, it is technologically possible to read even object code and obtain the secret information. Other commentators advocate special exemption applications when the registrant only sends the first and last twenty-five pages of the program, and then make the remainder a series of gibberish or unnecessary code. Still others seek to analogize their secrecy to the Copyright Office's special provisions for standardized test questions (only a one-fourth inch strip of each page is registered). Yet these attempts have not been accepted by the Copyright Office.

Another proposal is to turn over the program to the control of an escrow trustee or agent. *See generally* Nycum, *Understanding Escrow Complexities*, 4 COMPUTER L.J. 323 (1984). If the licensee erases his copy or needs the system debugged, the escrow trustee is obliged by the

legislative[207] proposals that are aimed at reforming the copyright statute. The legislative reforms proposed in the Appendix of this Comment are designed to redress many of the problems apparent with section 117 of the Copyright Act. The reforms are intended to place software copyright owners on an equal footing with copyright owners of works fixed in traditional media. The proposed statute is constructed based on the balancing approach outlined in section 107.[208.]

Section 1 of the proposed statute states the limits on the exclusive rights of owners of software. Subsection 1(a) of the proposed statute identifies the circumstances under which a computer program may be copied without infringement. Such specificity, which the present section 117 lacks, is necessary to closely circumscribe the extent of the use of authorized copies. Subsection 1(b) narrowly defines the scope and use of derivative works in the context of computer programs.[209] This section indicates that the copy owner is precluded from making more than one derivative program.[210] Finally, subsection 1(c) identifies those persons who are authorized to prepare copies without the copyright owner's permission. Consistent with other

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escrow agreement to allow access. However, this system is not only expensive and cumbersome, it is also impractical for mass distributed software.

Of course, computer programmers, who intimately understand the computer systems they create, have attempted to foil pirates by using technological barriers. One such barrier is encryption codes, which limits access to the inner workings of the program to those users who know the access code. For every sophisticated encryption scheme, however, there are several relatively cheap and easy methods for breaking the code. A more recent security attempt is the combination of disk and semiconductor chip encodation in which a unique serial number on the chip cues into the information contained on the disk. Again, this system can be broken. In addition, there is a user backlash to such technological schemes since they actually make software harder to use and nearly preclude safety backup copies. Association of Data Processing Serv. Org., ADAPSO newsletter, March 28, 1985.

207. *See, e.g.,* S. 339, 99th Cong., 1st Sess. (1985) (proposes implementation of Rule of the Shorter Term in computer programs); S. 3074, 98th Cong., 2d Sess. (1984) (proposes to penalize owner of copy who rents, leases, or lends the copy for direct or indirect commercial advantage without the copyright owner's authorization); H.R. 6024, 98th Cong., 2d Sess. (1984) (addition of new definitions to Copyright Act and extension of criminal penalties to pirates); H.R. 6983, 97th Cong., 2d Sess. (1982) (ADAPSO sponsored bill; amendment to the 1976 Copyright Act that broadens definition of copyrightable works).

In a related area, H.R. 5938, 98th Cong., 2d Sess. (1984) proposes a scheme for compulsory license of record rentals where the noncopyright owners of musical phonorecords would be allowed to rent, lease, or loan copies, but must pay a royalty from income received to the copyright owner. *See also* National Productivity and Innovation Act of 1983, 26 PAT. TRADE-MARK & COPYRIGHT J. (BNA) No. 646, at 456-62 (Sept. 15, 1983) (President Reagan's proposed modification of the antitrust and intellectual property laws).

208. *See supra* note 197 and accompanying text.

209. The proposed statute would also amend current § 101 to include within the definition of derivative works, "computer program versions specifically tailored for use with a designated hardware system."

210. *Contra* 17 U.S.C. § 117 (1982); *supra* note 142.

sections of copyright law,[211] only non-profit, educational institutions are designated as authorized to make such copies. Furthermore, this section indicates that even such institutions are precluded from making more than one identical copy.

The allowances described in the first three subsections of the proposed statute are narrowly limited in section 1(d). This section provides that the rights afforded in subsections 1(a) through 1(c) are not to be extended to situations that involve financial gain, such as when possession of the copy is acquired through rental, lease, or loan. This section therefore reestablishes the computer copyright owner's legitimate right to financially benefit from his labor.

Section 2 of the proposed statute creates a compulsory license scheme for individuals and organizations who seek to distribute copyrighted computer programs. A similar scheme is currently in use in the record industry under section 115. A compulsory license would ensure that the computer program copyright owner would receive a royalty from the subsequent distribution of the program. The proposed statute does not suggest a specific royalty figure for each software program since that figure should be based upon the market value of the program at the time of the enactment of the statute. The specific subsections of section 2 parallel similar sections dealing with compulsory licensing in the making and distribution of phonographic records.[212]

V. CONCLUSION

Although copyright law offers software developers the best means of protecting mass-marketed computer software, current copyright protection for software is inadequate. This Comment proposes a reform in the copyright statute designed to close the loopholes that pirates currently use to legitimize their conduct. The statute is narrowly drawn to promote the traditional balance of copyright law between the public's interest in using copyrighted work and the copyright owner's interest in remuneration. The enactment of this statute would lead to greater consistency and rationality in cases that arise from disputes over software owner's rights by precisely defining the limitations on the software owner's exclusive rights. The software copyright owner will then have legal protection equivalent to copyright owners whose intellectual products are memorialized in more traditional media.

William Christopher Graft

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211. *See supra* note 197 and accompanying text.

212. 17 U.S.C. § 2(a)-(c) (1982). *See also* Rosen, *A Common Law for the Ages of Intellectual Property*, 38 U. MIAMI L. REV. 769 (1984) (providing a detailed historical argument for compelling royalty payments to intellectual property developers).

APPENDIX: PROPOSED AMENDMENT TO COPYRIGHT ACT,
TITLE 17 SOFTWARE PIRACY PROTECTION ACT

PREAMBLE

The Software Piracy Protection Act of 1985 is designed to provide for increased copyright protection to software developers by precisely defining and delineating the parameters of the limitations on the software copyright owner's exclusive rights. This legislation is aimed at placing the software copyright owner on an equal footing with copyright owners whose works are memorialized in more traditional media.

§1 Limitations on Exclusive Rights: Computer Programs

(a) Notwithstanding the provisions of section 106 of this title, it is not an infringement for the owner of a copy of a computer program lawfully made under this title, or any person authorized by such owner, to make one identical copy of a particular program, if—

(1) the copy of the program is used exclusively by the copy owner and no further copies are made from it; and

(2) unless preserved exclusively for archival purposes, the copy is destroyed either within five years from the date of the making of the initial copy or in the event that continued possession of the computer program should cease to be rightful; and

(3) the archival copy is to be destroyed either within seven years from the date of the making of the copy or in the event that continued possession of the computer program should cease to be rightful.

(b) Notwithstanding the provisions of section 106 of this title, it is not an infringement for the owner of a copy of a computer program lawfully made under this title, or a person authorized by such owner, to prepare a derivative program consistent with the definition of derivative works under section 101 of this title, if—

(1) the derivative program is used exclusively by the copy owner; and

(2) no further derivative programs or copies are made from it.

(c) Notwithstanding the provisions of section 106 of this title, it is not an infringement for the owner of a copy of a computer program lawfully made under this title, or a person authorized by such owner, to make one identical copy or prepare a derivative program, if

(1) such copy or derivative program is to be used exclusively by a nonprofit educational institution; and

(2) no further copies or derivative programs are made from it.

(d) The privileges prescribed by subsections (a), (b) and (c) do not, unless authorized by the software copyright owner, extend to any person or organization who has acquired possession of the copy of a computer program from the copyright owner, by rental, lease, loan, or otherwise, without acquiring ownership of it.

§2 Scope of Exclusive Rights in Computer Programs: Compulsory License For Making and Distributing Software

In the case of computer programs, the exclusive rights of the copyright owner provided by clauses (1), (2) and (3) of section 106 of this title, to make and distribute copies and derivative programs of such programs, are subject to compulsory licensing under the conditions specified by this section.

(a) Availability and Scope of Compulsory License—

(1) When computer programs have been distributed to the public in the United States under the authority of the copyright owner, any other person or organization may, by complying with the provisions of this section, obtain a compulsory license to make and distribute copies and derivative programs. The use of such compulsory license is limited to distribution to the public for private use.

(b) Notice of Intention to Obtain Compulsory License—

(1) Any person who wishes to obtain a compulsory license under this section shall, before or within thirty days after making, and before distributing any computer programs, serve notice of intention to do so on the copyright owner. If the registration or other public records of the Copyright Office do not identify the copyright owner and include an address at which notice can be served, it shall be sufficient to file the notice of intention in the Copyright Office. The notice shall comply, in form, content and manner of service, with requirements that the Register of Copyrights shall prescribe by regulation.

(2) Failure to serve or file the notice required by clause (1) forecloses the possibility of a compulsory license and, in the absence of a negotiated license, renders the making and distribution of copies and derivative programs actionable as acts of infringement under section 501 of this title and fully subject to the remedies provided by sections 502 through 506 and 509 of this title.

(c) Royalty Payable under Compulsory License—

(1) To be entitled to receive royalties under a compulsory license, the copyright owner must be identified in the registration or other public records of the Copyright Office. The copyright owner is entitled to royalties for copies or derivative programs made and distributed after being so identified, but is not entitled to recover for any copies or derivative programs previously made and distributed.

(2) Except as provided by clause (1), the royalty under a compulsory license shall be payable for every copy or derivative program made and distributed in accordance with the license. For this purpose, a copy or derivative program is considered "distributed" if the person exercising the compulsory license has voluntarily and permanently parted with its possession. Royalties will be on a scale set in 1985 by the Copyright Royalty Commission, as provided by section 801 of this title, and subject to review at 5-year intervals thereafter.

(3) Royalty payments shall be made on or before the twentieth day of each month and shall include all royalties for the month next preceding. Each monthly payment shall be made under oath and shall comply with requirements that the Register of Copyrights shall prescribe by regulation.

§3 Section 101 of this title is amended as follows:
§101 Definitions

. . . .

A "derivative work" is a work based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, *computer program version specifically tailored for use with a designated computer hardware system,* abridgment, condensation, or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revisions, annotations, elaborations, or other modifications which, as a whole, represent an original work of authorship, is a "derivative work."