Chapter- III

COPYRIGHT PROTECTION FOR
COMPUTER SOFTWARE/
PROGRAM- A LEGAL
DIMENSION
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COPYRIGHT PROTECTION FOR COMPUTER SOFTWARE/PROGRAM
- A LEGAL DIMENSION

3.1 Growth of Technology and Copyright: an overview

Intellectual Property is one of the most important property rights which are granted by the state to a person. The tremendous increase in the knowledge economy has played a key role in the development of technology and in turn the progress of human beings. The new and original knowledge of creative expressions of ideas has been increasingly responsible for the development and growth of the intellectual property system. The intellectual property system has gained incredible importance due to the technological development enhancing the focus on intellectual property putting the system under intense scrutiny from various angles worldwide. In the case of copyright it developed with the printing press and inventing methods of mechanically storing and reproducing the copyright works such as printing books, photography, cinematograph and sound recording. The beginning of broadcasting provided a platform as to work that could be performed from distant places revolutionising the expansion of copyright to be exploited by the authors in a market economy. The digital revolution according to Peter Menell\textsuperscript{1} is the third distinct wave of technological innovation which includes internet\textsuperscript{2}.

\textsuperscript{2} Internet: Short for internetwork. A set of computer networks that may be dissimilar and are joined together by means of gateways that handle data transfer and conversion of messages from the sending networks protocols to those of the receiving network; The worldwide collection of networks and gateways that use the TCP/IP suite of protocols to communicate with one another; At the heart of the internet is a backbone of high-speed data communication lines between major nodes or host computers, consisting of thousands of commercial, government, educational and other computer systems that route data and messages. One or more internet nodes can go off line without endangering the internet as a whole or causing communication on the internet to stop, because no single computer or network controls it. The genesis of the internet was a decentralised network called ARPANET created by the Department of Defence in 1969 to facilitate communication in the event of a nuclear attack. Eventually other networks including BITNET, Usenet, UUCP and NSFnet, were connected to APRANET. Currently the internet offers a range of services to users such as FTP, e-mail, the World Wide Web, Usenet news, Gopher and others also called the ‘NET.’ Network in information technology, a network is a series of points or nodes interconnected by communication paths. Networks can interconnect with other networks and contain sub-networks. Networks can also be characterised in terms of spatial distance as local area networks (LANs), metropolitan area networks (MANs), and wide area networks (WANs). A given network can also be characterized by the type of data transmission technology in use on it (for example, a TCP/IP or Systems Network Architecture network); by whether it carries voice, data, or both kinds of signals; by who can use the network (public or private); by the usual nature of its connections (dial-up or
Whenever there is a new technological development or change the copyright law has always been flexible in facing challenges and taking step by step process in protecting new creative works. The digital technology has a tremendous impact on various sectors whether it being a publishing, musical, cinematograph or television industry. The mindset of industries have undergone a tremendous change due to the onslaught of digital technology. Today the publisher selling books, newspapers or magazines are offering their work in electronic form. In the same way the producer of sound recording sells tapes and CDs or film producer selling and renting the videos and DVDs or a broadcaster in communicating through television have to make adjustments to the digital technology.

Throughout the history, whenever there is a new technology coming into existence, there has been resistance by the concerned industries. Industries pursuing resistance started from print publishers against public libraries in renting; photocopying machine against the books and journals; music industry against radio; film and television industry against video cassette recorder; sound recording industry against analog cassette recorder and now the computer program and software against the use of digital content. However, the contention of the

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3 Internet access: the capability of a user to connect to the internet. A home user and many smaller organisations generally connect through a modern connected to a personal computer and use an ISP or on-line information services provider. Larger users may connect through a dedicated line. Recently communications can be established using TV-set top boxes and personal phones, although there tend to offer a restricted service such as e-mail and some Web access, supra n. 2.

4 WWW is a subset of the internet itself. The web consists of a huge collection of documents stored on computer around the world, and the Web is made up of special sites along the Internet that support Web browsing. On the Web, you navigate from one place to another by selecting a link that appears on a Web that appears on-screen. You just click the picture or text and your Web browser takes you to the corresponding link. Surfing the internet is as simple and easy as using windows. Acronym WWW also called w, W3, Web, supra n. 2.

5 Supra n. 1

6 Computer- a general purpose machine that processes data according to a set of instructions that are stored internally either temporarily or permanently. The computer and all equipment attached to it
industries on increased piracy and loss of revenue has fallen flat and on the other hand the demand for each of the new innovations has increased from time to time.\footnote{Supra n. 1}

The music or film industry was unable to perceive the digital piracy threat and it has consumed substantial time to bring the works into market affordability and high resolution means for perceiving digital content. The beginning of digital revolution microprocessors had a low fidelity of computer peripherals with limited memory storage capability to store music due to which, industries did not find much of a threat. It was early 1980s, where the recording, film and television industries found a threat from the new analog technology i.e. cassette tape recorders in home copying and video cassette recorder (VCR) respectively.\footnote{Ibid}


Continued advances in technology made in the storage capacity and innovation of micro computers with cost efficient provided a gateway to digital content in video and music industries.\footnote{The Moore’s law is known to the co-founder of the Intel Corporation who once stated that microchip capacity, and thus power, is doubled every year, or at least every 18 months which applies to the increase of storage space on computers. E.g. large hard disks were unaffordable to the consumers at the beginning of computing. Pieter Kleve and Feyo Kolff, Mp3: \textit{The End of Copyright As We Know It?} Centre for Computers and Law 1999 http://ssrn.com/abstract=1138651 last visited 2\textsuperscript{nd} July 2008}

The major shift in technological development was the introduction of World Wide
Web, data compression technologies, different forms of consumer electronics like portable hard drives useful for storing music, the increase in broadband for internet user. This led to the convergence of digital computers and traditional content users, leading towards finding new solutions to copyright protection.

The sound recording industry was the first to be affected by the digital revolution. The digital sound recording files being smaller in storage capacity led to different challenges to be faced by copyright law. The introduction of portable hard drives (MP3) made easier for user’s to copy and move any sound recording increased the copyright concern in the industry. The peer-to-peer\textsuperscript{11} software application had a drastic impact on the sound recording industry. The Napster’s software created a wave in the digital media where the aftermath of various peer-to-peer software programs and services has drawn into increased distribution of unauthorised sound recordings.\textsuperscript{12}

3.2 The Era of Analog Media

It was the invention of printing press or other mechanical way of reproduction of creative works of author which provided a platform for creation or production of more works. The protection of authors and publishers has been the objective of copyright protection. The copyright law was brought to restrain the person who copied the work. This right was to exist for a limited period of time, within which the authors and publishers would have reaped the benefits of their creation. The technological changes by way of creating, reproducing, storing the content and distributing the work of authorship have always had an effective role in amending copyright law from time to time. There has been a remarkable shift in the position of copyright law beginning from printing press to the current stage of digital media and the internet scenario.

\textsuperscript{11} Peer-to-peer architecture- a network of two or more computers that use the same program or type of program to communicate and share data; each computer or peer is considered equal in terms of responsibilities and each act as a server to the others in the network. Unlike client/server architecture, a dedicated fileserver is not required. However, network performance is generally not as good as under client/server, especially under heavy loads. Also called peer to-peer network. Supra n. 2

Any kind of storage and distribution of content, in the Analog Media and digital media is to be differentiated. For the purpose of copyright law Analog Media can be said to consist of phonographs, photographs, film, and photocopying including the way in which such content is distributed, received or perceived through broadcasting and cable television:

“They record or, to use copyright law's rubric, “fix” works of authorship through some human or mechanical process of deforming a physical object (such as stone, paper, vinyl, film) in a manner that conveys an image (a letter, number, or graphic image) or signal varying in audio frequency (sound) or light or colour intensity (film). The term ‘analog’ is used to signify that the medium uses an ‘analogy’ to represent the phenomenon. Even the advent of broadcasting technology--the transmission of a signal to multiple receiving devices--has been based upon analog propagation (wave forms) of analog encoded content (sound recordings etched in vinyl and later tape and audiovisual works fixed in film).”14

The history of copyright law shows that the reproduction of work used to be expensive and more importantly would not be able to provide the quality that the original work could have provided. Even after the introduction of photocopying machines though the original work could be copied, it could never have the quality of the original. In both the cases publisher would have knowledge if there is commercial use of the work by the infringer which worked as a deterrent to copy such work. This was more effective in the sound recording and cinematograph as the owner could regulate with his master copy of the work. The introduction of reel-to-reel machines or tape recorder could not provide the same quality of that of the original as the devices used for such reproduction had some limitations. Until the advent of Video Cassette Recorder (VCR) any cinematograph work would be available only in theatres or video parlours and thus completely regulated by the producer and the owners of the theatres. The introduction of the VCR provided a first of its kind where an individual could possess/own a physical copy of the film. Later, the invention of television provided a platform for these cinematograph

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13 Of pertaining to a mechanism that represents data by measurement of a continuous physical variable, as voltage or pressure. Analog computer: a computer that represents data by measurable quantities as voltage or formerly the rotation of gears, in order to solve a problem, rather than by expressing the data as numbers. Webster's Encyclopedic Unabridged Dictionary of the English Language, Gramercy Books, New York, 1996
14 Supra n. 1
works to be broadcasted. In this scenario, the broadcaster could control and monitor the content, thus still regulating the reproduction and distribution. The tape recorder and VCR provided the technology where home recording was done by consumers to copy the original work but that came with specific quality reduction. The analog nature of recording, (where the counterfeit could not have produced the work in its original form) any unauthorised reproduction and distribution could not deter the growth of these industries. Hence, the analog media and devices had limitation by way of quality of reproduction and also being expensive.

3.3 The Era of Digital Media- Rethinking the Copyright Law

Digital technology revolutionised the copyright issues with remarkable changes in the way in any work of authorship that can be protected. The flexibility offered by the digital media in storing, distributing and reproducing has taken a complete shift in development of copyright law. The encoding of programming in a computer provides a platform for a perfected reproduction and with no reduction of quality for subsequent reproductions. The internet rollout of

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15 Analog- pertaining to or being a device or signal that is continuously varying in strength or quantity, such as voltage or audio, rather than based on discrete units, such as the binary digits 1 and 0. A lighting dimmer switch is an analog device because it is not based on absolute settings. supra n. 2

16 Copy protection- computers a routine that is included in a program by its publisher to prevent the software from being duplicated except for a single backup copy. Digital computer- a computer that processes information in digital form; Analog computer- Digital involving or using numerical digits expressed in scale of notation to represent discretely all variables occurring in a problem. One of the keys or finger levers of keyboard instruments media or medium -the means of communication as radio and television, newspapers and magazines, that reach or influence people widely; pertaining to or concerned with such means; Digital computer in which operations are based on two or more discrete states. Binary digital computers are based on two states, logical “on” and “off” represented by two voltage levels, arrangements of which are used to represent all types of information -numbers, letters, graphics symbols and program instructions. Within such a computer, the states of various circuit components change continuously to move, operate on and save this information. supra n. 2

17 Digital computers recognise fluctuations in electrical voltage. Information is encoded using a massive array of binary switches which can be turned on or off depending upon whether they have a high or low charge. The smallest unit of memory in a computer is called “a bit,” a switch with a value of “0”(off) or “1”(on). A byte consists of group of eight bits. A kilobyte (“K”) contains 1024 (2^10) bytes, a megabyte (“MB”) 1024 kilobytes, and a gigabyte (“GB”) 1024 megabytes.

18 In programming, to put something into code, which frequently involves changing the form, for example, changing a decimal number to binary-coded form; also called encrypt- to encode (scramble) information in such a way that it is unreadable to all but those individuals possessing the key to the code. Encrypted information is known as cipher text. Also called encipher. supra n. 2

19 Binary- having two components, alternatives or outcomes. The binary number system has 2 as its base, so values are expressed as combinations of two digits, 0 and 1. These two digits can represent the logical values true and false as well as numerals, and they can be represented in an electronic
high bandwidth\textsuperscript{20} Internet access has unleashed the extraordinary capabilities of digital devices and networks through which the digital contents are transferable come with an advantage that the copying of work is without the bottlenecks which the Analog Media had. The owner's of the copyright work presently face a tremendous difficulty in controlling and monitoring their work. This has becoming tedious and expensive thing. This digital revolution has had so much impact that some traditional forms have become redundant or obsolete, e.g. typewriters. The computers through word processing programs and formats including the CDs, MP3 and DVDs, with printers or copying facilities have pushed the analog storage media to a standstill. \textsuperscript{21}

The replacement of vinyl and magnetic tape with introduction of compact disc format into the market has increased the digital content flow with ease. Though in the beginning the CD did not provide the recording capabilities, later developments in recording on CD's has drifted away the consumer from the traditional analog method. The quality and durability which exist in CD's further improved with the invention of DVD's during the end of 1990's. These developments have affected both the sound recording and the cinematograph film industries. The improvement may be found with high resolution works, searchability becoming easier and available in compressed form which could be downloaded and watched over the computer or laptops. The publishing industry has not been left behind. Today publishers are providing e-books made available in soft copy and can be downloaded by paying the cost of the book.

According to Peter Menell the principal factors and characteristics of an emerging digital content regime are "advances in microprocessor speed, memory

\textsuperscript{20} The amount of data that can be transmitted in a fixed time period; In digital transmissions it is measured in bits (or bytes) per second and in analog transmissions as cycles per second, or hertz, supra n. 2

\textsuperscript{21} Supra n. 1
storage, data compression; achievement of high sampling rates in capturing digital content; development of improved technologies for perceiving (listening to and viewing) digital content; essentially flawless, inexpensive, and rapid reproduction capabilities; precise manipulability of digital content; archive management and searchability; portability; development of digital networks for

22 The shift from analog media to digital media took off when the computers could achieve the speed and storing or memory capabilities of digital content. Information starting from micro computer and then in microprocessor could be stored with an increased speed with vast memory space. The hard drive (hard disk drives are faster, high capacity storage units that are completely enclosed in a protective case. The other disk drive is the floppy disk drives which are designed to accept removable disks) has increased its capacity of storing digital content from time to time. On the other hand the technology of compressing a digital content has reduced the memory capacity and bandwidth necessary to have access and store the content. (Such technology is often referred to as a “codec,” (short for coder/decoder- hardware that can convert audio or video signals between analog and digital forms/short from compressor/de-compressor - hardware or software that can compress and uncompress audio or video data.) or compression/decompression algorithm. A computer running a compressed file must have software to decompress the file. MP3 with its compression technology is an example where large digital content is made available in a compressed format file. Not only sound recording even downloading of huge quantity of films can be downloaded with this technology.

23 The benefit of digital technology is that it captures the wave forms in a separate data points rather than it being continuous representations in the analog phenomena. The digital technology will sample the physical phenomena at a very high rate where the differences between the real and its digital representation cannot be perceived by human beings. Thus the sound and visual motion in the form a CD can perceive high quality representation. The same technology makes the digital photography and cinematograph film which heavily relies on the high sampling rates. (Sampling is a process by which the value or items of an analog (i.e. continuous) signal is examined at distinct intervals of time. Sampling rate is the frequency with which a recording device, such as a sound board, takes readings of the sound it is recording. High quality sound boards, such as the sampling rates of 44.1 KHz or higher. Although sound boards with lower sampling rates may be adequate for recording simple noises or even voice clips, they are adequate for recording music.) The cinematograph film uses distinct representations of both the static images and the dynamic dimension which requires huge storing capability.

24 The binary codes which are used in digital media produce a perfect copy of the original work, thus reproduction is normally without any distortions. The analog technology which had to face the disadvantage of distortions is overcome by the digital media and provides efficient work. The publisher today can provide varieties of literary works in the digital form including eBooks. The literary work can now be also taking an advantage of integration with other media like sound and video. The ability of searching any research works has become easy.

25 The digital content can be stored without the loss of the quality of the original work. The access of any digital content has become so easy that, you may search any information which is made available. The copying of the work is done without expending much. The information can be stored or copied with the same quality and can be copied instantaneously. The reproduction of such works also has become very easy. There are CD and DVD burners and the Zip drives which can be used to store vast information.

26 One of the main factors contributing to the development of digital content and increase in copyright issues is the flexibility and the ease in which the content can be altered or or transformed. For e.g. a literary work can be used in such a way that the differentiation between the original and the copied work gets blurred or unidentifiable. Similarly, the digital images from a camera can be edited by taking help of computer software and changes be brought in the original work. The same is the case in sound recording and cinematograph film. The home recording is the result of such digital content being copied by the consumers according to their choices.

27 The management and searchability is one of the greatest advantages of digital technological
distributing content (including broadband); and convergence of distribution platforms."

3.4 Growth of Computer, Computer Software

The mid 19th century the development of mechanical devices to perform arithmetic operations was taking place. Towards the end of the 19th century the punched-card tabulating machine to automate the census was developed. The encoding of census data for individuals on separate card tabulating it mechanically was designed. Herman Hollerith who did this formed a company called the Tabulating Machine Company (1896) which later was merged and emerged as International Business Machine (IBM) in 1924. The Company started serving the growing demand for office machinery, such as typewriters, record-keeping systems, and adding machines. In 1930s IBM developed a machine which could compare cards, a significant innovation enabling machines to perform simple logic operations. The development of electronic calculating machine could resolve very
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complicated physics computations. The ABC (Atanasoff Berry Computer) was invented which was more sophisticated version. This development was a breakthrough revolution of modern computers which harnessed the electrical impulses to process information.

The Electromechanical Computer Mark I which could perform speedier additions per second and one multiplication every six seconds turned out to be massive development in computer technology. The Electronic Numerical Integrator and Computer (ENIAC 1946) was the next step of development where the computer operated in decimal rather than binary code using vacuum tubes rather than mechanical relays to store binary information, used by the United States Army to compute trajectory tables to improve the targeting of weaponry. All subsequent computers started using binary form. The early computer created a single bit of information by setting electrical switches where electrical current flows in “on” positions and which does not flow in “off” position. This piece of information is now read as either a ‘1’ (‘on’) or 0 (‘off’). Thus, computer could perform mathematical operations by translating information into a series of such 1s and 0s. The earlier computers used series of hard-wired circuits constructed to perform one particular computational task. It had to be rewired in order to perform a different function. Hence, the computing machines did not utilise computer “programs” as we use in present form, they were comprised of what we call hardware i.e. the physical circuits that make up the machine. The machines that could store and use encoded instructions or programs were first innovations thenceforth increasing the flexibility and usefulness of computers (in late 1940s). The performance of the computational task could now be done without having to rewire the basic hardware of the computer. The computer could be directed to perform a specific function stored in its memory and the machines which are programmable i.e. the Central Processing Unit (CPU).

32 developed by Vincent Atanasoff and Clifford Berry 1942
33 Dr. John Mauchly, J Presper Eckert, cited at Supra n. 1
34 Capable of accepting instructions for performing a task or an operation; Being programmable is a characteristic of computer. supra n. 2
35 CPU- is the main part of a computer, it carries out all of the instructions from a program. The CPU contains the arithmetic logic unit, the control unit, the registers and often some memory. The CPU is sometimes called the central processor or processor. It has two principal components an
The first commercially viable electronic computer, the Universal Automatic Computer (UNIVAC I) was considered to be the first generation of programmable computers. The utility of computers enhanced due to the flexibility provided by programmability. However, as these computers relied upon vacuum tubes, much risk was attached to their frequent failure which also consumed heavy energy and generated substantial heat. These programmes could be intelligible only to experts in the field. IBM 650 in 1954 was the first commercial computer with all necessary prerequisites for operating system which carried forward the digital revolution.

The transformation of computer took place from vacuum tubes to transistors which drastically reduced the size of the switches which were used by binary electronic arithmetic logic unit which performs a basic set of “primitive functions” such as addition and multiplication and a control unit which directs the flow of electric signals within the computer. In essence, a computer processes data by performing controlled sequences of primitive functions.

Operating system: the master control program that runs the computer. It is the first program loaded when the computer is turned on, and its main part, called the kernel, resides in memory at all times. It may be developed by the vendor of the computer its running in or by a third party. It is an important component of the computer system, because is sets the standards for the application programs that run in it. All programs much talk to the operating system. The main difference between an operating system and a network operating system is its multiuser capability. Operating systems, such as Macintosh System 7, DOS and Widows, are single user, designed for one person at a desktop computer. Windows NT and UNIX on the other hand are network operating systems, because they are designed to manage multiple user requests at the same time. An operating system is also called an executive or supervisor. Operating system performs the following functions: User interface, Job Management, Task Management Data Management, device management and security. User interface: the user interface or shell provides the interaction between the user and the operating system. Operating systems may allow for different shells; for e.g. DOS and UNIX provide command-driven interfaces but can host other shells that provide a menu driven or graphical interface. Even Windows, which is graphics based to begin with, allows other shells to provide an interface to the user; The earliest operating systems were developed in the late 1950s to manage tape storage, but programmers mostly wrote their own I/O routines. In the mid 1960s operating systems became essential to manage disks, complex timesharing and multitasking systems. Today all multi-purpose computers from micro to mainframe use an operating system. Special-purpose devices (appliances, games, toys, etc.) generally do not. They usually employ a single program that performs all the required I/O and processing tasks. Supra note 2; an operating system is the program that, after being initially loaded into the computer by a boot program, manages all the other programs in a computer. The other programs are called applications or application programs. The application programs make use of the operating system by making requests for services through a defined application program interface. In addition, users can interact directly with the operating system through a user interface such as a command language or a graphical user interface (GUI); Application programming interface (API) is a set of routines used by an application program to direct the performance of procedures by the computer’s operating system. supra n. 2
switches to store and process the information. The IBM 7090 was the first computer which used the transistors. This period also made way for high level computer languages, enabling computer experts to write programs using coded instructions that resemble human language. For the first time large scale data processing could be done through these computers. The next step was the innovation of integrated circuits that allowed incorporation of many transistors within the layers of semiconductor material. This in turn increased the computing power, efficiency and was also becoming cost effective. Hence there was tremendous increase in the data processing services. The computers could now perform multiple tasks like parallel processing and multiprogramming at the same time. This era also witnessed the implementation of time sharing and telecommunication technologies enabling access by multiple users of a computer

38 Second Generation Computer Technology (1959-63); Binary- having two components, alternatives or outcomes; The binary number system has 2 as its base, so values are expressed as combination of two digits, 0 and 1. These two digits can represent the logical values true and false as well as numerals, and they can be represented in an electronic device by the two states on and off, recognised as two voltage levels. Therefore, the binary number system is at the heart of digital computing. Although ideal for computers, binary numbers are usually difficult for people to interpret because they are repetitive strings of 1s and 0s. To ease translation, programmers and others who habitually work with the computer’s internal processing abilities use hexadecimal (base-16) or octal (base-8) numbers. Binary code: A rule for transforming data, program instructions or other information into a symbolic form in which only the two binary digits 0 and 1 are used; Once encoded there is no way of distinguishing an instruction from a piece of data. The process of transforming letters, digits and other characters into sequences of binary digits is called binary encoding, and the representation used or produced is called a binary encoding. The binary notation used to represent numbers in a computer is a binary encoding. The representation of characters using, for example, ASCII Scheme is another example. supra n. 2

39 Computer language: an artificial language that specifies instructions to be expected on a computer. The term covers a wide spectrum from binary-coded machine language to high-level languages. High level language—a type of programming language whose features reflect the requirements of the programmer; it achieves this by being designed for the solution of problems in one or more areas of application. High level languages are thus described as application oriented (or problem oriented). They are easier for the programmer to use than low-level languages, being closer to natural language and to the language of mathematics. The first high level languages were released in the late 1950s. The number and variety now available is large and still growing. Examples include BASIC, COBOL, FORTRAN, ALGOL, PASCAL, ADA, PROLOG and C++. Some of the languages are used for specific purposes e.g. COBOL was developed for commercial data processing and FORTRAN is widely used for scientific computation. supra n. 2

40 (IBM 705, used the FORTAN language processor)

41 Third Generation Computer Technology (1963-75)

42 (IBM 360 series were used as these computers used single machine language. By using the same computer program they could do the data processing within the company) supra n. 2

43 Timesharing: the use of a computer system by more than one individual at the same time. Time sharing runs separate programs concurrently by interleaving portions of processing time allotted to each program (user); a method used primarily in the 60s and 70s for sharing the capabilities (and cost) of a computer, such as a mainframe. Timesharing allowed different clients to ‘rent’ time on a large computer and pay for only the portion of time they used. supra n. 2

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from remote terminals. The first minicomputer was made for the domestic consumers which began in 1965 after the invention of integrated circuit and the number of transistors per square inch on integrated circuits had doubled every year. And this was bound to increase in future, which popularly came to be known as "Moore’s Law."  

The present generation computer began with a microprocessor chip development, which contained the entire control unit of a computer. The development of the microcomputer took place due to very large scale integration technology. Apple II computer system came out with a computer with a keyboard, monitor, floppy disk drive, and operating system.

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44 The Digital Equipment Corporation by PDP-8 (Programmed Data Processor) was smaller and was about 1/4 the price of mainframe computers

45 Gordon Moore was one of the founders of Intel Corporation- the semiconductor chips into the computers, which drastically reduced the size of the computer with increase in computer power (With more than 100000 transistors); a prediction by him in the early days of the computer revolution regarding the growth of semiconductor technology. Moore predicted that the number of transistors that could be put on a chip would double every year, and it did. Ten years later, Moore predicted that chip capacity would double every two years and capacity has actually doubled every 18 months since then. The doubling of capacity every 18 months is popularly referred to as a 'Law', supra n. 2

46 Late 1970s by Intel Corporation; chip- a set of microminiaturised, electronic circuits that are designed for use as processors and memory in computers and countless consumer and industrial products; Chips are the driving force in this industry. Small chips can hold from a handful to tens of thousands of transistors. They look like tiny chips of aluminum, no more than 1/16" square by 1/30" thick, which is where the term "chip", came from. Large chips, which can be more than a half inch square, hold millions transistors. The term chip, integrated circuit and microchip are synonymous. supra n. 2

47 Fourth Generation Computer Technology (1975-present); microcomputer- a computer system that uses a microprocessor as its processing unit; The central control and arithmetic element is thus fabricated on (usually one tiny chip of semiconductor material. In addition a microcomputer contains storage and input/output facilities for data and programs, possibly all on the same chip as the microprocessor; Microprocessor- a CPU on a single chip. They are at the heart of all personal computers. A modern microprocessor can have several million transistors in an integrated-circuit package that can easily fit into the palm of one’s hand, supra n. 2

48 The master control program that runs the computer; It is the first program loaded when the computer is turned on, and its main part called the kernel, resides in memory at all times. It may be developed by the vendor of the computer it's running in or by a third party. It is an important component of the computer system, because it sets the standards for the application programs that run in it. All programs must "talk to" the operating system. The main difference between an operating system and a network operating system is its multiuser capability. Operating system such as Macintosh System 7, DOS and Windows are single user, designed for one person at a desktop computer. Windows NT and UNIX on the other hand are network operating systems, because they are designed to manage multiple user requests at the same time. An operating system is also called an executive or supervisor. They perform following functions: user interface; job management; task management; data management; device management; security, supra n. 2
3.5 Definition and Nature of Computer and Computer Software

“Computer program” has been defined as a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result. This “set of statements or instructions,” in its literal or written manifestation, may be in the form of object code or source code. It may also be represented, in a partially literal manifestation, by a flowchart. A copyright work designed for use on a computer may include, as well, text that appears, for example, in a problem manual or a manual of instructions. These elements of text, however, ordinarily are not referred to in the industry as part of a “computer program” unless they appear on the computer screen and serve a purpose like that of the components of a “help screen” available to a user whenever needed.

The Lotus Dev. Corp. v Paperback Software Int’l had elaborately examined the meaning of computer and computer software and its working. Digital computers (computers) are machines used to perform three types of functions electronically, they are:

- arithmetic calculations
- logical operations (e.g., comparing values to determine whether one is larger) and
- storage and display of the results

Computers can perform millions of operations of these types in a single second. They can be used to solve complex problems and those which are repetitious and boring, to be solved manually. A personal computer system consists of hardware and software. The hardware includes the Central Processing Unit (CPU), which contains the electronic circuits that control the computer and perform the arithmetic and logical functions, the internal memory of the computer (Random Access Memory or RAM), input devices such as a keyboard and mouse, output devices such as a display screen and printer and storage devices such as hard and floppy disk drives. The software includes one or more computer programs, usually stored magnetically on hard or floppy disks, along with such items as instruction manuals and ‘templates’ as pieces of plastic that fit around the

49 17 United States Copyright Act, 1976, (USCA), Section 101
function keys on the keyboard, identifying the specific functions or commands that can be invoked by those keys. A personal computer system can also include ‘firmware’ or ‘microcode’. Microcode is a set of encoded instructions that controls the fine details of the execution of one or more primitive functions of a computer. Microcode serves as a substitute for certain elements of the hardware circuitry that had previously controlled that function.

Computer programs are, in general, divided into two types:

- Operating system programs
- Application programs

Operating system programs—such as DOS, XENIX, and OS/2—are programs that control the basic functions of the computer hardware, such as the efficient utilisation of memory and the starting and stopping of application programs. Application programs are programs that permit a user to perform some particular task such as word processing, database management, or spreadsheet calculations, or those that permit a user to play video games.

“Computer Program” is that in which the digitised material can be used as a program to drive the electronic hardware of the computer itself. This is the case both for the basic operating system of the machine and for applications programs for work processing, product design and many other things. Computer storage and output—the ability to store quantities of information in digitised form means that investment goes into accumulations of knowledge from the most mundane

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51 Firmware—software routines stored in read-only memory (ROM); Unlike RAM, read only memory stays intact even in the absence of electrical power. Startup routines and low level input/output instructions are stored in firmware. It falls between software and hardware in terms of ease of modification, supra n. 2


53 Software that simulates a paper spreadsheet or worksheet, in which columns of numbers are summed for budgets and plans; it appears on screen as a matrix of rows cells; Spreadsheets can have thousands of cells and can be scrolled horizontally and vertically in order to view them. The cells are filled with labels, numeric values and formulas, supra n. 2

compilations to sophisticated treatments which enhance access or reach a level of real originality which is referred as "multi-media".55

Computer programs are typically written in some form of computer programming ‘language.’ The ‘lowest’-level computer programming language is machine language, which is a binary language written in ‘bits’ (short form of Binary digits).56 Each bit is equal to one binary decision— that is, to the designation of one of two possible and equally likely values, such as an “on”-“off” or “yes”- “no” choice. These binary decisions, the only kind that a typical computer can understand directly, are commonly represented by 0’s and 1’s. A sequence of eight bits (which allows 256 unique combinations of bits) is commonly called a ‘byte’ (by eight), and 1024 bytes form a ‘kilobyte’ (commonly referred to as ‘K,’ e.g., sixty-four kilobytes is ‘64K’). Machine language may also be represented in hexadecimal form, rather than in binary form, by the characters 0-9 and A-F, where ‘A’ represents 10, ‘B’ represents 11, and so on through ‘F,’ which represents ‘15.’ In hexadecimal machine language, only two rather than eight characters are required to allow for 256 unique combinations (e.g., 37 instead of 00110111, each of which represents the 55th of 256 combinations; 7B instead of 01111011, each of which represents the 123rd of 256 combinations; EA instead of 11101010, each of which represents the 234th of 256 combinations). The computer will be able to translate these hexadecimal instructions into binary form. Other versions of machine language are represented in decimal (0-9) and octal (0-7) form.57 An object program, or object code, is a program written in machine language that can be executed directly by the computer’s CPU without need for

55 Cornish
56 Bit—short for Binary digit. The smallest unit of information handled by a computer; One bit expresses a 1 or a 0 in a binary numeral, or a true or false logical condition, and is represented physically by an element such as a high or low voltage at one point in a circuit or a small spot on a disk magnetised one way or the other. A single bit conveys little information a human would consider meaningful. A group of 8 bits, however, makes up a byte, which can be used to represent many types of information, such as letter of the alphabet, decimal digit, or other character. Machine language— the native language of the computer; In order for a program to run, it must be presented to the computer as binary-coded machine instructions that are specific to that CPU model or family. Machine language is created by programs called assemblers, compilers and interpreters, which convert the lines of programming code a human writes into the machine language the computer understands. Machine language tells the computer what to do and where to do it, supra n. 2
For example, in the machine language of a certain computer, the instructions to divide the value in ‘B’ by the value in ‘C’ and add that number to the value in ‘A’ may be represented by the following sequence of instructions (in binary form):

An ‘intermediate’-level programming language is assembly language. Assembly code is written in simple symbolic names, or alphanumeric symbols, more easily understandable by human programmers rather than in “bits.” For example, the calculation described above may be represented, in the assembly language of a certain computer, as follows: LOAD B; DIV C; ADD A. Because of the primitive nature of assembly language, even relatively simple computations can require long and complex programs.59

During the early period of computing, ‘programmers’ ordinarily wrote programs exclusively in machine language. Nowadays the object code is rarely written directly by computer programmers, rather modern programmers typically write computer programs in a “higher”-level programming language. These programs are called source programs, or source code.60 Although “source code”

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58 Object code: in programming, the machine-readable instructions created by a compiler or interpreter from source code. Source code: Human readable program statements written by a programmer or developer in a high-level or assembly language that are not directly readable by a computer. Source code needs to be compiled into object code before it can be executed by a computer. Supra n. 2; A source code is a computer program written in any of several programming languages employed by computer programmers. An object code is the version of a program in which the source code language is converted or translated into the machine language of the computer with which it is to be used”, Final Report of the National Commission on New Technological Uses of Copyrighted Works (CONTO) 21 (1978); Object code: in a computer program there can be a source code and object code. Many computer programs in the market are available with an object code. The object code is now protected under the copyright law. The object code in a computer program involves the protection of the object code itself and the output of the program which may include audio, visual output.

59 Assembly language is a Low-level programming language that has instructions written using abbreviations and codes called symbolic instructions codes, or mnemonics. supra n. 2

60 A source code is a computer program written in any of several programming languages employed by computer programmers. An object code is the version of a program in which the source code language is converted or translated into the machine language of the computer with which it is to be used” Final Report of the National Commission on New Technological Uses of Copyrighted Works (CONTO) 21 (1978) A computer program by definition is ‘a set of statements or instructions to be used directly or indirectly in a computer. A source code program is used “indirectly” and an object code program is used “directly”. 17 U.S.C. S 101 Cited at Melville B. Nimmer & David Nimmer, Nimmer on Copyright p 2-52.1 “Computer readable” means of pertaining to or characteristic of information that can be interpreted and acted on by a computer. Two types of information are referred to as computer readable: bar codes, magnetic tape, magnetic-ink characters, and other
has been defined far more broadly in some of the literature in the field, more
commonly the term "source code" refers to a computer program written in some
programming language-such as FORTRAN (FORMula TRANslation), COBOL
(COMmon Business Oriented Language), PASCAL, BASIC, or C-that uses
complex symbolic names, along with complex rules of syntax.\textsuperscript{61} In a typical
higher-level programming language, for example, the above-described
computation-i.e., \( (A) + (B/C) \)-might be represented as follows: \( A + B/C \).

Unlike machine language, which is unique to each kind of CPU and which
is executed directly by the computer, source code programming languages are
universal to almost all computers. As a consequence, source code is executed
indirectly. Thus, a program written in source code must be translated into the
appropriate object code for execution in one type of computer and into a different
object code for execution in another type of computer. The translation can be
effectuated by an 'interpreter' program or by a 'compiler' program.\textsuperscript{62} An
'interpreter' program is a simultaneous translator that works in conjunction with
the application program every time the application program is run, carrying out the
instructions of the program one step at a time.\textsuperscript{63} In contrast, a 'compiler' program
translates the program once and for all onto machine language, after which the
translated program can be executed directly by the CPU without the need for any
further resort to the compiler. A distinctive 'interpreter' or 'compiler' program is

\textsuperscript{61} The grammar of a language; the rules governing the structure and content of statements., supra n. 2
\textsuperscript{62} Compile- to translate all the source code of a program from a high-level language into object
code prior to execution of the program; Object code is executable machine code or a variation of
machine code. More generally, compiling is sometimes used to describe translating any high-level
symbolic description into a lower-level symbolic or machine-readable format. A program that
performs this task is known as a compiler; compiler- a program that takes as input a program
written in a high level language, such as pascal or Fortran, and translates it into machine code. The
input to the compiler is called the source program and the output is called the object program. The
object program is usually stored separately from the source program. The translation process is
known as compilation, and the program that has been translated is said to have been compiled. The
entire program must be compiled before it can be executed, supra n. 2
\textsuperscript{63} A computer program that has a specific use; for e.g. A word processor program, a graphics
program or a database, supra note 2; An application program (application) is any program designed
to perform a specific function directly for the user or, in some cases, for another application
program. Examples of application programs include word processors; database programs; Web
browsers; development tools; drawing, paint, and image editing programs; and communication
programs. Application programs use the services of the computer's operating system and other
supporting programs.
available for each type of source code programming language and each type of CPU.

A partly literal and partly pictorial manifestation of a computer program, still farther removed from direct use with the computer, is the flowchart. A flowchart is a graphic representation of a computer program that is written in symbols, rather than in bits or symbolic names, and with a syntax that is graphic rather than grammatical. A flowchart can be thought of as a kind of symbolic outlines or schematic representation of a computer program’s logic, which is written by a programmer once he/she has a conceptualization of the goals of the program. Creating a flowchart (at least, an early draft) is thus, typically, an early phase in the development of a software system, which is followed by the translation of the flowchart into source code.

Computer software is normally used to explain computer programs and resultant materials. Computer software is a collection of items and materials associated with the development and operation of a computer program, but not including computer hardware. Thus:

“a preparatory design materials like flowcharts, diagrams, specifications, form and report layout; computer programs source code and object code; software developments tools, like relational database development systems, compilers, report generations; information stored on computer media like conventional works, any literary, artistic and musical work digitally sorted; databases; computer output, like sound,

64 Flowchart—a graphic map of the path of control or data through the operations in a program or an information-handling system; symbols such as squares, diamonds and ovals represent various operations. These symbols are connected by lines and arrows to indicate the flow of data or control from one point to another. Flowcharts are used both as aids in showing the way a proposed program will work and as a means of understanding the operations of an existing program, supra n. 2
66 See Peter Menell, An Analysis of the Scope of Copyright Protection for Application Programs, 41 Stan L. Rev. 1045, 1051 (1989) (identifying five stages in the development of most application programs: (1) defining the desired task; (2) flowcharting; (3) encoding; (4) debugging; and (5) preparing documentation). On computers and computer programs in general, see Lewis Affidavit, 18-42 (Docket No. 274); Galler Declaration, 8-20 (Docket No. 257); A. Clapes, software, Copyright & Competition: The “Look and Feel” of the Law 47-64 (1989); R. Bradbeer, P. DeBono & P. Laurie, The Beginner’s Guide to Computers (1982); McGraw-Hill Dictionary of Scientific and Technical Terms (3d ed. 1984). Referred in Lotus Development Corporation v Paperback Software International, 740 F. Supp (1990) 15 U.S.P.Q 2d 1577
printout, computer files etc; screen displays; manuals and guide on paper or digitally stored; and programming language.  

However, software, permanently stored in computer and its equipments are included in the computer hardware. The computer programs may be of two forms by itself, the source code and the object code. The former is the program originally written in a computer programming in a human readable form and latter is the program which is referred as a machine language of the computer's central processing unit known as the object code.

A computer program is basically a set of instructions, which the computer executes to achieve the result desired by the programmer. Although a program is stored within a computer as a long string of ones and zeros, the so-called binary code, the program itself is written in easily understood high-level languages that are later translated into the object code to operate the computer. Software written in this format is known as source code. For the purpose of copyright law, a computer program consists of both literal and non-literal elements. The literal elements are the program's source and object code with that set of instructions ensures that the computer hardware performs certain functions. The average computer user has little or no contact with these elements. For the user, the more important aspect of a computer program is what he/she will see on the screen. These so-called non-literal elements, sometimes are called the "look and feel" or "user interface" of a program, that do not lend themselves easily to definition but

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67 Bainbridge David, *Software Copyright Law*, 3rd ed. Butterworth's, 1997, p 2-3; computer hardware are computers, monitors, printers, disc drives, CD-ROM player's, modems, cabling and mouse etc, p 3


69 Look and Feel- generally refers to the user interface of a program, especially with regard to its similarity to other programs. This issue has been and will continue to be hotly contested in the courts, because some programs look and function like others, and the original developer sometimes gets upset about it. Oddly enough, programming languages have never been copyrighted or patented, which allows a developer to write a compiler that translates a language identical to one already in use. However, when a vendor sells a software package that looks and feels like another, it is subject to litigation, and look and feel cases have been won in the U.S Courts. User Interface: the user interface or shell provides the interaction between the user and the operating system. Operating system may allow for different shells; for e.g. DOS and UNIX provide command-driven or graphical interface. Even Window, which is graphics based to begin with, allows other shells to provide an interface to the user; supra n. 2
may be described as those features of a computer program which a user perceives and enables him to execute the program with ease and comfort. These may be the way a computer program “opens or closes,” the specific icons representing tasks, the structure of menus and other similar features.  

3.6 Computer Generated Programmes

Computer generated programme in relation to a work, means that the work is generated by computer in circumstances that there is no human author of the work.  

It is true that, there must be an author of any original work. In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken. This makes it clear that there is an author for any creation of a computer program. Hence, as soon as the computer program is created we may assign the authorship to such work. There are two characteristic to understand whether the work is computer generated, content and format. Further, characteristics can be detailed with four categories of works produced in the way which involves programmed computer. They are

- works produced with the aid of a programmed computer
- works produced by a programmed computer
- intermediate works and
- output derived from expert systems

Firstly, Document produced using a word processing program, a table of calculation made with the help of spreadsheet program. Such works are not computer generated as the author is the person using the computer to produce the work and computer used merely as a tool. Content of the work is governed entirely by the person using the programmed computer, as is the format of the work. There may be some minor control over elements of the format exerted by programmed computer but the format is basically by the creator of the work. It is

71 CDPA (UK)Section 178
72 CDPA, 1988, UK, Section 9(3)
73 Bainbridge David, Software Copyright Law, 3rd ed. Butterworth's, 1997, p 2-3; computer hardware are computers, monitors, printers, disc drives, CD-ROM player's, modems, cabling and mouse etc. p 230-235
similar to typewriter being used to create a work. Hence, when computer is used as a tool in creation of the work, the work fails to be covered as computer generated work.

Secondly, Works are produced by computer with very little human intervention. It is a result of operation of a programmed computer, for e.g. computer code automatically generated from a screen layouts designed by the user. The user of computer has little control over the format and the content of the output. This will be covered as computer generated work. The author is a person who makes the arrangements necessary for the work to be created. In the U.K and the U.S a person who creates a programmed computer will be the author and determines the owner of such work. The user of the programmed computer does not have right in the output because user did not provide anything to the content of the output. In *Midway Manufacturing Inc v Artic International Inc*, the court held, the copyright in a video game i.e. the screen display lies with the game’s creator and not with the person who plays the video games. User may make some contribution to the final output but as the user is constrained by the instructions in the program for the game, the copyright rests with the creator and not with the user.

Thirdly, “intermediate works” are those which lie between the above said two categories. Works which are connected with the human expertise requirement to produce the work flows from one or more source and is partly direct or partly indirect. The content of the output produced using the programmed computer is the result of the skill of the person operating it combined with the skill of the person or persons responsible for the designing and writing the computer programs. The operator may have only limited effect on the format of the finished work. E.g. output produced by specialised accounting system for a particular type of business or music created by a music synthesiser or price breakdowns produced using a system to assist with the production of estimates and quotations. Here user will exercise a fair degree of skill and expertise and can be considered to be author and

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74 (1983) 464 US 823
hence a completed work will be a blend of human and computer creation. However, the law has not dealt these issues effectively.

Lastly, "Expert System" is different from conventional computer systems. It is designed to provide advice at or approaching the level of an expert professional. It is different with conventional computer system i.e. firstly, it comprises knowledge base having rules and facts developed using experts in the domain represented with knowledge engineers to identify structure and formalise knowledge. Secondly, the inference engine, a computer program or set of programs attempting to resolve enquiries by user of the system on interacting with knowledge base, that may be readymade (shell) or program specially written for the particular application. And thirdly, user interface to make the system usable in easy manner and providing means of inspecting the advice produced by the system, supplying an explanation to the advice given and means of verifying the same. Thus, in accordance with copyright law, expert systems are the result of a joint creation of few persons. The output resulting in using the expert system will have joint authors sharing different work with different proportions. Similarly, where an expert system is used to create a new piece of musical work and people who developed using such system may claim to be joint authors of the work in that work.\textsuperscript{75} Except the applicability in the context of rule of \textit{de minimis}, the work may be protected under copyright law as a work of joint authors, e.g. instruction to a user to take a medicine before going to bed is considered to be very trivial to afford copyright protection. Brainbridge David, suggest that, authorship and ownership issues in such cases can be resolved by adopting the licencing provisions in favour of the person acquiring a lawful computer program. Where the licencee may use, copy or publish the work depending on terms and conditions.

3.7 A Paradigm Shift towards Copyright Protection to Computer Software

Computer programs have been included in the category of literary work in all national and international legislations providing copyright protection. Computer industry in the beginning bundled the computer software along with the computer

\textsuperscript{75} In law the joint authorship is where individual contributions of the joint authors are not distinct from each other.
hardware and were protecting their interests by contracts or by way of trade secret agreements. By this, they could also protect their economic interest. In addition, the software protection was protected by way of patent which adequately protected the innovations as manufactured products. In the later development, software companies started offering customised software to the customers. The programming being a highly specialised industry, provided services, according to the machine, the tasks it needed to perform and customer. Hence, the customer used to get tailor made software that was very easy to monitor and enforce the contractual liability. The minicomputers and microchip computers, the computer system and computer programs proliferated to a very wide market. Now the software products for the user’s computer system could be installed with very fewer customisations. This came out with the software products that could be now sold without bundling with the computers system.76

The legal protection for computer software in the beginning was through the trade secret agreements.77 The courts in the initial stages confirmed the protection through the trade secret agreement as it was difficult for non experts in the field to disseminate the secret as they were in the form of object code.78 Reverse engineering a computer programme from the object code was very daunting task and also consumed huge amount of time.79 However, protection of computer software under the trade secret agreement could not go a long way as it could regulate only those who had contracted with the company and could not get protected against the competition of third parties.80

The digital threat to the copyright system had delayed a bit due to the non availability of the computer software in the digital form. The compact disk technology of the 1980s and marked development of microcomputer chip was

76 IBM started selling software without bundling the hardware in 1970s
78 See Q-Co Industries v. Hoffman, 625 F. Supp. 608, 617 (S.D.N.Y. 1985) (program secret where source code secret, even though object code disseminated); Telex Corp. v. IBM, 510 F.2d 894, 911, 928-30 (10th Cir.), cert. dismissed, 423 U.S. 802 (1975)
made available to the consumer market. The innovation of WWW put forth new dimensions for the flow of content in the digital media. Later development in the computer storage capacity, processor speed, data compression, consumer electronic products like MP3 players, digital video recorders, network software including peer-to-peer architectures and bandwidth revolutionised the distribution of digital content. The swift increase of peer-to-peer networks and the cracking and disseminating means of decrypting the DVD Content Scrambling System and other technological protection measures exhibit susceptibility and thereby difficult to regulate the copyright protection or digital piracy.

The classification of computer software into a specific set of IP protection was not a very easy job. On the one hand, computer software could have been protected by its nature as written codes as literary expression amenable to protection under copyright law. On the other hand the software being a set of instructions for performing tasks was closely related to the functional works protected under Patent Law. In U.S. patent protection for computer software though opposed by industry was granted in few cases. However, the Patent and Trademark Office in U.S came out with the guidelines stating computer programming process producing no more than a numerical, statistical or other informational result will not be patentable subject matter.

In the early days of computer it was suggested that there must be a sui generis right for computer programs. There was no immediate remedy to claim protection and hence the computer programs started gaining momentum to be treated as literary work under the copyright law. The Computer Programs Directive prepared a draft in supporting the computer program to be protected under the copyright law. This also was useful for the preparatory work in both the Berne

81 Ibid
83 For example, Applied Data Research, Inc. received a patent on a sorting program in 1968. U.S. Patent No. 3,380,029 (1968)
84 33 Fed Reg. 15,609, 15, 610 (1968) the guidelines did, however, provide that a programmed computer could be claimed as a component of a patentable process if it was “combined in an unobvious manner with physical steps” that produced a physical result.
Protocol Committee and the TRIPS negotiation group. The draft paper lists the doubts raised and the answers favouring copyright protection of computer program:\textsuperscript{85}

Justification for protection of computer program under copyright law

<table>
<thead>
<tr>
<th>Doubts raised</th>
<th>Answers</th>
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<tr>
<td>(a) the purpose of computer programs is to cause a computer- i.e., a machine-</td>
<td>Computer programs are basically writings, and under Article 2(1) of the Berne Convention, the purpose for which writings are created is irrelevant from the point of view of their qualifying as literary works; not only works of literature proper, but also scientific writings and writings with a purely utilitarian or commercial aim should be protected as literary works, if they are original intellectual creations</td>
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<tr>
<td>to perform or achieve a particular task or result, which is alien to the notion</td>
<td>of literary and artistic works</td>
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<td>of literary and artistic works</td>
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<td>(b) although computer programs in source code form can be perceived by</td>
<td>Computer programs in object code form share the copyright status of other literary and artistic works stored in computer systems in machine-readable form; they can be retrieved-`decompiled'- into a form in which they are available to human beings; if it were true that works in machine-readable form-from which they can be retrieved and made available in such a way-were not protected, that would be the end of copyright protection because, with the quick development of computer technology, nearly all categories of works can be included in computer systems in such a way; storage of works in a computer system must be considered reproduction</td>
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<tr>
<td>human beings- it is not the case in respect of computer programs in object code</td>
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<td>form</td>
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<td>(c) computer programs are frequently made of sub-routine elements, and such</td>
<td>With the exception of a few simple programs, there is sufficient room for creativity in making computer programs; unless an unreasonably high originality test is applied, nearly all computer programs would pass such a test</td>
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<tr>
<td>programs may not be considered original</td>
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<th>(d) copyright laws cannot be applied directly for the protection of computer programs; specific provisions are necessary</th>
<th>The need for specific provisions does not mean that the protection of a certain category of works would be alien to copyright; the Berne Convention and national copyright laws also include specific provisions in respect of various other categories of literary and artistic works</th>
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<tr>
<td>(e) the 50 year post mortem auctoris minimum term of protection under the Berne Convention is too long, since computer programs usually become outdated in a much shorter time</td>
<td>The alleged problem of too long term of protection is of an academic nature; there are a number of other categories of literary and artistic works which may become obsolete within a much shorter period than 50 years; the latter should be considered nothing other than an upper limit</td>
</tr>
<tr>
<td>(f) copyright does not protect algorithms, which are considered the most fundamental creative elements of computer programs</td>
<td>It is quite appropriate that copyright does not protect algorithms- as it does not protect any idea, procedure, process, method of operation, concept, principle or discover, in general- but only the concrete expressions thereof; this is precisely why copyright can offer appropriate protection for computer programs without creating unreasonable obstacles to independent creation of such programs.</td>
</tr>
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</table>

Article 2(1) of the Berne Convention, 1886 provides for protection of authors work. It defines copyright to be the following:

"The expression "literary and artistic works" shall include every production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression, such as books, pamphlets and other writings; lectures, addresses, sermons and other works of the same nature; dramatic or dramaticomusical works; choreographic works and entertainments in dumb show; musical compositions with or without words; cinematographic works to which are assimilated works expressed by a process analogous to cinematography; works of

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86 Berne Convention Article 2 (3) Translations, adaptations, arrangements of music and other alterations of a literary or artistic work shall be protected as original works without prejudice to the copyright in the original work.

(4) It shall be a matter for legislation in the countries of the Union to determine the protection to be granted to official texts of a legislative, administrative and legal nature, and to official translations of such texts.

(5) Collections of literary or artistic works such as encyclopaedias and anthologies which, by reason of the selection and arrangement of their contents, constitute intellectual creations shall be protected as such, without prejudice to the copyright in each of the works forming part of such collections.
drawing, painting, architecture, sculpture, engraving and lithography; photographic works to which are assimilated works expressed by a process analogous to photography; works of applied art; illustrations, maps, plans, sketches and three-dimensional works relative to geography, topography, architecture or science.”

The Berne Convention provides that the work shall be fixed in some material form. Protection subsists in original works of authorship fixed in any tangible medium of expression and unless and until it is recorded in writing or otherwise. The Berne Convention obviously could not make any provision for protection of computer programme but later also it was thought it was practically difficult in including the same in the Berne Convention. Computer program however, secured protection under the TRIPS Agreement.

“computer programs”, whether in source or object code, shall be protected as literary works under the Berne Convention (read with Rome Convention 1971) and secondly, compilations of data or other material, whether in machine readable or other form, which by reason of the selection or arrangement of their contents constitute intellectual creations shall be protected as such. Such protection, which shall not extend to the data or material itself, shall be without prejudice to any copyright subsisting in the data or material itself.”

Specific provision was included obliging members to protect the computer programs as literary works under the Berne Convention. WIPO Copyright Treaty, 1996 (WCT) incorporated the provision of protecting computer programs under Article 4 wherein it stated that ‘Computer Programs’ are protected as literary works within the meaning of Article 2 of the Berne Convention. Such protection applies to computer programs, whatever may be the mode or form of their expression. The scope of protection for computer programs under Article 4 of this Treaty, read with Article 2, is consistent with Article 2 of the Berne Convention and on par with the relevant provisions of the TRIPS Agreement.

87 Article 2 (2) It shall, however, be a matter for legislation in the countries of the Union to prescribe that works in general or any specified categories of works shall not be protected unless they have been fixed in some material form.
88 Article 10(1) Protection of Computer Programs and Compilations of Data
89 Article 2 Scope of Copyright Protection: Copyright protection extends to expressions and not to ideas, procedures, methods of operation or mathematical concepts as such.
Legislative action by enacting few laws and amendment to the existing provisions are moving towards achieving this. The courts have also taken a robust approach towards interpreting the law in protection of computer programs under copyright law. In India, the legislature has amended the Copyright Act, 1957 to the effect to include computer program as a literary work and few exceptions have been provided which may not amount to an infringement. However, the law in India is still in its infancy and hence very few cases can be cited in this regard. There is a move towards protection of digital content as a property right, development of effecting controls in distribution of content and ultimately copyright enforcement in cases of infringement. Thus we are moving towards a regulatory regime of protection of copyright in computer software and its content.

3.8 Copyright Protection of Computer Software in United States

In the beginning it was the U.S courts that recognised copyright to a computer software or computer program. And the same has been accepted and afforded to be protected as literary work. The Copyright Office in the U.S began to protect computer programs based on fulfilment of the following three conditions:

- the work contained sufficient original authorship
- the work was published with a copyright notice and
- copies of the program submitted for registration were in human-readable form which meant that it should be a source code and not the object code90

The first step towards protection of computer program and computer software under the copyright regime in the U.S was made only in 1976. The U.S Congress referred this, to National Commission on New Technological Uses of Copyrighted Works (hereinafter CONTU) which, recommended that the intellectual work embodied in computer software should be protected principally under copyright law.91

CONTU looking into the effect of new technologies on the status of intellectual property recommended that "computer programs, to the extent that they

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90 Copyright Office Circular 31D (Jan. 1965); George D. Cary, Copyright Registration and Computer Programs 11 Bull; Copyright Society362 (1964) cited at supra n. 1
embody an author’s original creation, are proper subject matter of copyright.” CONTU also recommended that, the fundamental limitation reflected in the idea/expression dichotomy that copyright law cannot protect “any idea, procedure, process, system, method of operation, concept, principle, or discovery” and should apply with same force in relation to computer programs. “Copyright protection for programs does not threaten to block the use of ideas or program language previously developed by others when that use is necessary to achieve a certain result. When other language is available, programmers are free to read copyrighted programs and use the ideas embodied in them in preparing their own works and one is always free to make the machine do the same thing as it would if it had the copyrighted work placed in it, but only by one’s own creative effort rather than by piracy.” The U.S Copyright Act, 1976 (USCA) following the recommendation of CONTU added the definition of computer program and amended Section 117 to authorise the owner of a computer program to make another copy or adaptation of the program for the purpose of running the program on a computer.

92 17 USCA, Section 102(b)
93 CONTU Report p. 21
94 USCA, Section 117-Limitations on exclusive rights: Computer programs
(a) Making of Additional Copy or Adaptation by Owner of Copy-
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 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.
(b) Lease, Sale, or Other Transfer of Additional Copy or Adaptation-
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.
(c) Machine Maintenance or Repair-
Notwithstanding the provisions of section 106, it is not an infringement for the owner or lessee of a machine to make or authorize the making of a copy of a computer program if such copy is made solely by virtue of the activation of a machine that lawfully contains an authorised copy of the computer program, for purposes only of maintenance or repair of that machine, if-
(1) Such new copy is used in no other manner and is destroyed immediately after the maintenance or repair is completed; and
(2) With respect to any computer program or part thereof that is not necessary for that machine to be activated, such program or part thereof is not accessed or used other than to make such new copy by virtue of the activation of the machine.
95 “Computer program” as “a set of statements or instructions to be used directly or indirectly in a
The computer program, synthesized music, video games, multi-media works etc., are the new modes of expression. The digital media can be used by anyone, with the help of computer and the internet connection. The legislative actions and judicial approach in protection of digital content has been under the cover of copyright law. The digital media has made possible for an author to come out with newer forms of creative expressions. The creation of work is made possible with less cost of production, with a better quality and also provides various networks for distribution of such works, for e.g., the producers can use computer programs mixing in production of a cinematograph film.

Basically, computer program and software in the U.S. came under the purview of two major intellectual property regime i.e. the patent law and copyright law. However, the U.K law provided computer software with copyright protection only. The U.K law has been followed in India by protecting the computer program as a copyright work under the heading literary work.

In *Gottschalk v Benson* the Supreme Court of U.S refused to grant patent protection to computer software. Benson filed an application for an invention which was described as being related 'to the processing of data by program and more particularly to the programmed conversion of numerical information' in general-purpose digital computers. They claimed a method for converting binary-computer in order to bring about a certain result".

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96 Computer- A general purpose machine that processes data according to a set of instructions that are stored internally either temporarily or permanently. The computer and all equipment attached to it are called hardware. The instructions that tell it what to do are called software. A set of instructions that perform a particular task is called a program or software program. Compute: to perform calculations or to use a computer or cause it to do work.; Computer-A computer is a device that accepts information (in the form of digitalized data) and manipulates it for some result based on a program or sequence of instructions on how the data is to be processed. Complex computers also include the means for storing data (including the program, which is also a form of data) for some necessary duration. A program may be invariable and built into the computer (and called logic circuitry as it is on microprocessors) or different programs may be provided to the computer (loaded into its storage and then started by an administrator or user). Today's computers have both kinds of programming; Computer Program- A set of instructions in some computer language intended to be executed on a computer so as to perform some task. The term usually implies a self-contained entity, as opposed to a routine or a library. supra n. 2


98 409 U.S. 63 (1972)
coded decimal (BCD) numerals into pure binary numerals. The claims were not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use but they purported to cover any use of the claimed method in a general-purpose digital computer of any type. Held, in a computer program, a mathematical formula without substantial practical application except in connection with digital computer was not a patentable process. This decision led the computer software industry to rush for protection under the copyright law. A digital computer, as distinguished from an analog computer, operates on data expressed in digits, solving a problem by doing arithmetic as a person would do it by head and hand. Some of the digits are stored as components of the computer. Others are introduced into the computer in a form which it is designed to recognise. The computer operates then upon both new and previously stored data. The general-purpose computer is designed to perform operations under many different programs. The representation of numbers may be in the form of a time series of electrical impulses, magnetised spots on the surface of tapes, drums, or discs, charged spots on cathode-ray tube screens, the presence or absence of punched holes on paper cards, or other devices. The method or program is a sequence of coded instructions for a digital computer and

99 A system for encoding decimal numbers in binary form to avoid rounding and conversion errors; in binary-coded decimal coding, each digit of a decimal number is coded separately as a binary numeral. Each of the decimal digits 0 through 9 is coded in 4 bits and for ease of reading each group of 4 bits is separated by a space. This format is also called 8-4-2-1. Thus a decimal number 12 is 0001 0010 in binary-coded decimal notation, supra n 2

100 See R. Benrey, Understanding Digital Computers, 4 (1964); analog computer- a computer that accepts and processes data in the form of a continuously variable quantity whose magnitude is made proportional to the value of the data. An analog computer solves problems by physical analogy, usually electrical. Each quantity (e.g. Temperature, speed, displacement) that occurs in the problem is represented in the computer by a continuously variable quantity such as voltage. Circuit elements in the computer are interconnected in such a way that the voltages fed to them interact in the same way as the quantities in the real-life problem interact. The output voltage then represents the numerical solution of the problem. Analog computers are used in situations where a continuous representation of data is more convenient or more useful that the discrete representation that is required by a digital computer, supra n. 2

101 The patent was sought on a method of programming a general-purpose digital computer which converts signals from binary-coded decimal form into pure binary form. A procedure for solving a given type of mathematical problem is known as an 'algorithm.' The procedures set forth in the present claims were of that kind; that is to say, they were a generalized formulation for programs to solve mathematical problems of converting one form of numerical representation to another. From the generic formulation, programs may be developed as specific applications. The decimal system uses as digits the 10 symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. The value represented by any digit depends, as it does in any positional system of notation, both on its individual value and on its relative position in the numeral. Decimal numerals are written by placing digits in the appropriate
concluded by holding "...the creation of programs has undergone substantial and satisfactory growth in the absence of patent protection and that copyright protection for programs is presently available."

Section 102 of the USCA provides the subject matter of protection102 in the following words:

“(a) Copyright protection subsists, in accordance with this title, 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.”
(b) “in no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work.”

The literary works are protectable for its creation from the skill, labour, judgment and capital of the author. Any person with a creative work is protected with proprietary right as an author or owner. Literary works are said to be works other than audiovisual works expressed in words, numbers, or other verbal or numerical symbols or indicia, regardless of the nature of material objects such as books, periodicals manuscripts phonorecords, tapes, film discs or cards, in which they are embodied.103 Literary work includes sermons, addresses and dramatic or dramatic-musical compositions. In the case of audio visual works it may still constitute a literary work. A motion picture for e.g. may consist of both audio visual and literary work. Audio visual work normally consists of a series of related images.

102 USCA, 1976 Section 102 (1) and (2) Subject matter of protection- Works of authorship include the following categories: (1) literary works; (2) musical works, including any accompanying words; (3) dramatic works, including any accompanying music; (4) pantomimes and choreographic works; (5) pictorial, graphic, and sculptural works; (6) motion pictures and other audiovisual works; (7) sound recordings and (8) architectural works.”

103 17 USCA Section 101
Databases are also considered as literary work as compilations and preparatory design material for computer programs. Such work may be computer generated.\textsuperscript{104} Similarly, a sound recording and cinematograph may be digitally recorded like music or film in a CD-ROM\textsuperscript{105} or in a chip which can be considered as computer program.

The computer program consisting of source code was accepted as copyright work without much debate. The source code of a computer program that were written on paper were protected as literary work as they were only in the human readable form. However, the controversy surrounding the copyrightability of the object code was because it was machine readable and invisible to the naked eyes. The immense growth of computer in the later stage which led to wide spread piracy and copying made the policy makers and judiciary to think on protecting the computer programs including the object code. The owner of computer programs in the beginning used to sell the same with a licencing agreement where he could sue for breach of the licencing agreement. Later realising the strong lobby of copyright industry the trend of protecting the computer program as copyright law developed.

The statutory definition of "literary works" is broad enough to include computer data bases and programs, that includes all 'verbal or numerical symbols or indicia, regardless of the nature of the material objects, such as... tapes, discs or cards, in which they are embodied.'\textsuperscript{106} Computer data bases and programs are protected to the extent that they incorporate authorship in the programmer’s expression of original ideas, as distinguished from the ideas themselves.\textsuperscript{107} The same has been accorded statutory recognition by the Computer Software Copyright Act of 1980.\textsuperscript{108} It provided that a “computer program” is a set of statements or

\textsuperscript{104} Ibid
\textsuperscript{105} Acronym for compact disc read only memory. A form of storage characterised by high capacity (roughly 650 megabytes) and the use of laser optics rather than magnetic means for reading data. Although CD-ROM drives are strictly read-only, they are similar to CD-R drives (write once, read many), optical WORM devices, and optical read write drives. 2. An individual CD Compact disc designed for use with a computer and capable of storing up to 650 megabytes of data.
\textsuperscript{106} 17 USCA, Section 101; See Atari Games Corp. v Oman 888 F.2d 878, 885 n.8 (D.C. Cir. 1989)
\textsuperscript{107} The House Committee Report P 54 cited at Melville B. Nimmer & David Nimmer, Nimmer on Copyright. P 2-51
\textsuperscript{108} Definition of Computer programme was added to USCA, Section 101 by the 1980 Act.
instructions to be used directly or indirectly in a computer, in order to bring about a certain result.

Computer program is now recognised as a work of authorship entitling copyright protection. Computer program written is protected not only in the conventional human language, known as source code, but also as to programs written in machine-readable language, known as an object code. A source code program is used "indirectly" and an object code program is used "directly." As literary works are copyright protected regardless of the nature of the material objects in which they are embodied, the copyrightability of a computer program is not vitiated by the fact that it is fixed in an internal permanent memory device (ROM), consisting of a semiconductor chip that is incorporated into the circuitry of a computer. Protection also recognised regardless of whether program is fixed in a ROM silicon chip, a floppy disc or in magnetic tape. Thus, reproduction of a semiconductor chip may itself constitute copyright infringement of the program contained therein. A Microcode, the lowest level of instructions that interpret higher level commands, also has been accorded protection. A work in a digital form which will be a computer program may be a romantic novel that has been input into a computer or a song, movie, or any other work across the spectrum of copyrightability. In White-Smith Music Publishing Co. v Apollo Co. it was held,

109 Williams Elecs. Inc. v Artic Int'l Inc. 685 F.2d 870 (3rd Cir. 1982); Apple Computer Inc. v Franklin computer Corp. 714 F.2d 1240 (3rd Cir. 1983); Data Cash Systems Inc v J S & A Group, 480 F. Supp 1063 (ND Ill 1979) when the defendant copies plaintiff's ROM chip containing a program for a computer chess game, it was for the first time held, is not protected by copyright law as it was not in the form in which it could be seen and read with the naked eye. This was overruled in Apple Computer Inc v Franklin Computer Corp. 714 F.2d 1240 (3rd Cir. 1983)

110 Apple Computer Inc. v Franklin computer Corp 714 F.2d 1240 (3rd Cir. 1983); Apple Computer Inc. v Formula Int'l Inc. 562 F. Supp 775 (C.D. Cal. 1983); Midway Mfg. Co. v Strobor 564 F.Supp. 741 (N.D. Ill. 1983)

111 17 USCA, Section 101 Cited at Melville B. Nimmer & David Nimmer, Nimmer on Copyright, p 2-52.1


114 NEC Corp. v Intel Corp. 645 F. Supp 590 (N.D. Cal. 1986)

115 209 US 1 28 S. Ct. 319, where it was held that an unauthorised manufacturer and seller of perforated music rolls (piano rolls) did not infringe the copyright owner's exclusive right to copy because the piano rolls were not copies as a copy must be a written or printed record in intelligible
that infringing copy must be perceptible to the naked eye and hence any unauthorised input perceptible only by use of a machine would not have constituted a copyright infringement. However, the principle is now abandoned as copy will now include any material objects whereby a work may be perceived, reproduced or otherwise communicated, either directly or with the aid of a machine or device. Thus, it is true of a computer program in its object code stage.\textsuperscript{117}

The foundation of idea/expression dichotomy was laid down in \textit{Baker v Selden}\textsuperscript{118} where the Supreme Court of U.S held copyright in the book did not extend to the system of bookkeeping described in the book. The description of an art in a book does not confer an exclusive right on the author over the art itself. The idea-expression debate continues even in the digital arena of what is to be protected and could not be protected. CONTU Report had made possible to render protectable the expression of a program, without necessarily granting a monopoly in its idea, i.e., in the methodology or processes adopted by the programmer,\textsuperscript{119} for example, when a person copies the pages of book he/she would be liable for copyright infringement. But a person who ruled up the pages in accordance with the system and not copying from the pages of the book would not infringe copyright of the author. Contextually applying to computer program, say a spreadsheet with a facility to produce simple charts from the data entered into the spreadsheet is not protected by copyright which is an idea only. Wherein developing a spreadsheet, person copying certain features of an existing spreadsheet program would infringe copyright as expression has been copied. The whole object of not protecting ideas is to exclude granting monopoly to an idea being protected which would stifle the competition and innovation.\textsuperscript{120}

\textsuperscript{117}Williams Electronics, Inc. v Artic International, Inc., 685 F.2d 870
\textsuperscript{118}101 U.S. 99 (1879)
\textsuperscript{119}The House Report (H Rep. p 54 no protection for the programmer’s algorithms) and the CONTU Report both assumed that such a dichotomy is possible.
\textsuperscript{120}See Bainbridge David, \textit{Software Copyright Law}, 3\textsuperscript{rd} ed. Butterworth’s, 1997, p 2-3; computer hardware are computers, monitors, printers, disc drives, CD-ROM player’s, modems, cabling and mouse etc. p 73
The idea-expression issue as regards computer programs was squarely raised in *Apple Computer Inc. v Franklin Computer Corp.*, where the issue was copyrightability of computer operating system programs, as distinguished from applications programs. The defendant acknowledged the copyrightability of application programs, but argued that operating system programs are not copyright work by reason of the *Baker v Selden* doctrine, and its codification in Section 102(b) of the USCA, which precludes copyright in a process, a system or a method of operation. The court of appeals held that, operating system programs can claim copyright and *per se* are not uncopyrightable. Apple did not seek to copyright the method which instructs the computer to perform its operating functions but only the instructions themselves... Both operating system programs and application programs instruct the computer to do something. Therefore, it should make no difference for purposes of Section 102(b) whether these instructions tell the computer to help prepare an income tax return (the task of an application program) or to translate object code form (the task of an operating system program...). In reaching this conclusion, the court rejected the expansive interpretations given to *Baker v Selden*, which would either deny copyright ability to utilitarian works, or would distinguish between copying for purposes of use and for purposes of explanation. The court nevertheless found sufficient residual force, so as to require remand for a factual determination as to whether “some or all of Apple’s operating programs represent the only means of expression of the idea underlying them.”

The court expressed doubt that there was in fact such a merger of idea and expression but conceded that if there were, then the expression could not be the subject of copyright. *Hubco Data Products Corp. v Management Assistance, Inc.* also upheld the copyrightability of computer system programs.

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121 *Apple Computer v Franklin Computer Corp.*, 714 F.2d 1240, 1246-48 (3d Cir. 1983), cert. dismissed, 464 U.S. 1033 (1984), Application programs perform a specific task for a computer user, such as word processing check book balancing, or playing a game. Operating system programs manage the internal functions of the computer or facilitate use of application programs. For example, an operating system program translates an application program from source code form to object code form. One case compares application programs to stage plays, and the operating system software to the proscenium arch. *Apple Computer, Inc. v Microsoft Corp.*, 759 F. Supp 1444, 1447 (N.D. Cal. 1991)

122 101 U.S. 99 (1879)

123 *Baker v Selden* 101 U.S. 99 (1879)

There is no infringement of copyright in using or copying something if such copying or use is the only way to put a particular idea into practice.\textsuperscript{125} In \textit{Mazer v Stein}\textsuperscript{126} the court reiterated that copyrightability focuses on work, i.e. original, tangible expression of authors ideas. Such expression, whether meticulously delineating the model or mental image or conveying the meaning by modernistic form or colour, is protectable. The copyright protects originality rather than novelty or invention conferring only the sole right of multiplying copies. Absent copying there can be no infringement of copyright. In \textit{Feist Publication Inc. v Rural Tel. Serv. Co}\textsuperscript{127} the U.S Supreme Court said that "no one can claim originality as to facts. This is because facts do not owe their origin to an act of authorship. The distinction is one between creation and discovery: the first person to find and report a particular fact has not created the fact; he or she has merely discovered its existence.... One who discovers a fact is not its maker or originator. The discoverer merely finds and records". It distinguished ideas, processes, and discoveries from an author's original compilation, arrangement, or selection of facts. The latter is found to be eligible for copyright protection.

The questions posed in the beginning was as to copyright protection should exclude computer software functionality that may be covered under the patent law. The legislative intent after the CONTU report made it clear that the computer software should be afforded copyright protection excluding the functionality. The courts beginning with Altai case distinguished idea from expression in software programs.\textsuperscript{128} Thus the computer software protection effectively prohibiting

\textsuperscript{125} Baker \textit{v} Selden 101 U.S. 99 (1879)
\textsuperscript{126} 347 U.S. 201 (1954)
\textsuperscript{127} 499 U.S. 340 (1991)
\textsuperscript{128} Computer Associates International \textit{v} Altai, Inc, 982 F.2d 693 (1992); the same general standard of infringement applies for claims of infringement in the context of computer programs. Generally, the claimant must show that he is the owner of a copyright work and that the defendant copied protected elements of the work. The owner must then show direct evidence of copying or that the defendant had access to the owner's work and that the works are substantially similar. The test applicable for infringement for software programs, however, become much more complicated and requires a very meticulous analysis. There are two standards applicable in deciding the level of similarity: the "virtual identity" standard and the test of "substantial similarity." The test for substantial similarity is "whether an average lay observer would recognise the alleged copy as having been appropriated from the copyrighted work." If the test of substantial similarity is met, then the inquiry becomes whether the defendant misappropriated a significant element of the owner's work or if the appropriation is so small as to be trivial or what is referred to as \textit{de minimis}.
wholesale piracy of computer programs without affording control for interface specifications and other essential elements of computer functionality. The courts later allowed the development of interoperable programs through reverse engineer software programs balancing the software developers and the industries.\textsuperscript{129}

In \textit{Stern Electronics v. Kaufman},\textsuperscript{130} the owner of a work in an arcade video game sued a competitor for infringing the copyright in the audiovisual work comprising the game. The competitor defended on the ground that it had not copied the underlying computer code, but rather had imitated the screen display images, which failed to satisfy the fixation and originality requirements of the USCA.\textsuperscript{131} Since the player of the game affects the displayed image through manipulation of the game controller, the owner of the copyright in the underlying code could not, in the view of the defendant, establish that the displayed image is “fixed” or “original.” However, the court observed otherwise and held that:

“Many aspects of the sights and the sequence of their appearance remain constant during each play of the game. These include the appearance (shape, colour, and size) of the player’s spaceship, the enemy craft, the ground missile bases and fuel depots, and the terrain over which (and beneath which) the player’s ship flies, as well as the sequence in which the missile bases, fuel depots, and terrain appears.

The terms itself is somewhat vague and ambiguous. It can be difficult to discern whether the elements of a program when copied are considered \textit{de minimus} or not. The issue turns on the nature of the programs at hand and requires a case-by-case analysis. Where claims concern works that are not entirely protected by copyright or only portions of the program are copyrightable, such works will only garner minimal protection and will be evaluated pursuant to the virtual identity standard. Pursuant to this test, a “bodily appropriation of expression,” must be found in order to “win the day” on infringement. In other words there must be an unauthorised use or copying of substantially the entire item at issue. Put simply, under the virtual identity standard, there must be almost an exact replica of the owner’s work in order to find that the defendant has indeed engaged in copyright infringement. In \textit{Ets-Hokin v Skyy Spirits Inc}, F.3d 763 (9th Cir. 2003) where a professional photographer object for others taking a photograph of a Skyy’s iconic blue vodka bottle the court testing with the virtual identity test held it did not amount to infringement of copyright. Though the impugned photographs were similar, this was inevitable given the shared concept or idea of photographing. When applying the limited doctrines like subtracting the unoriginal elements, the first photograph will have only a ‘thin’ copyright which gets protection only against virtual identical copying. Thus courts prevent authors not to monopolise the ideas. However, where the substantial similarity is the basis of copyright infringement where originality is high, the author has to show that the copied work is virtually identical then he may have remedies.

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\textsuperscript{129} Supra n. 1

\textsuperscript{130} 669 F.2d 852 (2d Cir. 1982)

\textsuperscript{131} Copyright Act, 17 USCA, Section 102 (a) provides that “copyright protection subsists ... in original works of authorship fixed in any tangible medium of expression, now known or later developed in which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device...."
Also constant are the sounds heard whenever the player successfully destroys an enemy craft or installation or fails to avoid an enemy missile or laser. It is true, as appellants contend that some of these sights and sounds will not be seen and heard during each play of the game in the event that the player’s spaceship is destroyed before the entire course is traversed. But the images remain fixed, capable of being seen and heard each time a player succeeds in keeping his spaceship aloft long enough to permit the appearances of all the images and sounds of a complete play of the game. The repetitive sequence of a substantial portion of the sights and sounds of the game qualifies for copyright protection as an audiovisual work.”

The first few cases decided on the literal copying of program code, courts held that the wholesale reproduction of a computer program in whatever form the computer program was embodied was an infringement of copyright. However, the most difficult task for the courts was to decide upon the issue of copyright protection that extends to non-literal aspects of computer programs (such as their sequence, structure, and organisation) and interface specifications. The letters, signs and symbols representing the program will get protection under copyright law. The debate however, is to the non-literal aspects of a computer program. The way the program is constructed or the structure, sequenced and organisation of the program is done. The case laws have supported the protection given to these non-literal part of the computer program. However, this has been a great challenge to the courts in establishing the protection. It was Apple Computer v Franklin Computer Corp. which expanded the protection of copyright in non literal use of computer program.

3.9.1: Challenges to Copyright Law for Computer Software

The courts had to face a stern challenge specifically in four issues:

➤ protection for those aspects of computer software that allow for

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132 NEC v Intel Corp., 1989 WL 67434, at 1 (N.D. Cal. 1989) (microcode); Apple Computer v Franklin Computer Corp., 714 F.2d 1240, 1246-48 (3d Cir. 1983), cert. dismissed, 464 U.S. 1033 (1984) (program stored in ROM); Williams Electronics, Inc. v Arctic Int'l, Inc., 685 F.2d 870 (3d Cir. 1982) (object code, program stored in ROM). The copying of literal program code and other aspects of computer programs, such as structural features of a program, operating elements (e.g., menu command systems), program outputs (e.g., screen displays), and user interfaces, quickly became the focus of numerous lawsuits and the courts were called upon to determine the scope of copyright protection for computer software

interoperability, whether between computing machines, machines and software programs, or different software programs;

- whether programmers can reverse engineer software programs;
- the protection of menu command structures; and
- protection for graphical user interfaces.\textsuperscript{134}

Copyright is granted to a work which is expressed in a particular form. The copyright protection is provided irrespective of the language or format in which it is expressed by the author. As discussed in the second chapter the ideas are not protected and only the expression of those ideas in a tangible form that gets protection under copyright law. The creative work in the case of computer program with a design or source code once is fixed in a tangible medium of expression gets copyright protection. The work may be in the form of print or may be stored in a computer which are said to be human readable form. Source code of a computer program may be complex program sequence which involves selection of different variables or arranging those sequences and to design any other aspects of a computer program. A computer program is protectable where there was merger between idea and expressions as it involved complex and extensive nature of creative work involved. Hence the source code, including direct copying of lines of source code, file layouts, source code parameters and software commands were protected under copyright law.\textsuperscript{135} However, the components of the code, including simple routines, preliminary lists of functions or source code commands standing alone as it is done in a literary work where words or simple common statements of rules of a game or contest will not get copyright protection.\textsuperscript{136} Neither copyright law protects mere commands like an order to “go to windows” or “go to hyperlink” etc.\textsuperscript{137} Any unorganised list or group of functions or options titles that might be incorporated into a program does not contain expression distinct from the idea of the functions. Command codes used as interface for telephone systems which are arbitrarily chosen codes and not protectable.\textsuperscript{138} In the case of flow chart and other

\textsuperscript{134} The discussion that follows draws upon Peter S. Menell, \textit{An Epitaph for Traditional Copyright Protection of Network Features of Computer Software}, 43 Antitrust Bull. 651 (1998)

\textsuperscript{135} Control Data Systems Inc v Infoware Inc, 903 F.Supp.1316 (D. Minn. 1995)

\textsuperscript{136} Morissev v Procter & Gamble Co 379 F.2d 675


\textsuperscript{138} Mitel, Inc v Iqtel Inc, 124 F.3d 1366
depictions of program design an underlying algorithm\textsuperscript{139} or idea are not protected unless it is expressed in a particular form in a flow chart or other format. And any flow chart with only decorative features or patterns which describes only steps to be taken cannot get copyright protection.\textsuperscript{140}

It is now established that a source code and works having program design is protected under copyright law. However, owner should still prove copying by the defendant. The author, similar to any other copyright work has to prove he had the exclusive right of reproduction or distribution and infringement of such work occurred.\textsuperscript{141} Any alteration of the sequence, arrangement or selections of symbols may not be protected as copyright as it may be treated as idea and not an expression of idea. So a compilation of terms, symbols or commands expressed in a particular form if it is original work, may seek copyright protection.\textsuperscript{142} When there is creative work which is translated in to different and high level computer programming language for example like a Basic translated into FORTRAN, ALGOL, and PASCAL language where the structure, organisation and flow and commands will undergo a change can be treated as copying of original work.\textsuperscript{143}

In the case of computer program the idea and expression distinction is a prominent test in identifying the copyright infringement. The author of a computer program will only be concerned with the performance of the program or the aesthetics of what the program produces. He will not be concerned in the benefit

\textsuperscript{139} Algorithms is a set of simple and clearly defined instructions or steps that when followed precisely enables some operation to be performed. No personal judgments have to be made. Algorithms can be devised for a great variety of operations, ranging widely in complexity. As the complexity increases the number of steps to be taken increases; since they involve no personal judgment they are suitable for computers to handle. When a computer is to perform a particular task an appropriate algorithm is selected or is specially written. It is expressed in a formal notation-a programming language- and such forms a major part of a computer program, supra note 2.

\textsuperscript{140} Tompkins Graphics, Inc v Zipatone, Inc 222 U.S.P.Q (BNA) 49 (where it was held circles and squares not copyrightable)

\textsuperscript{141} Apple Computer Inc. v Microsoft Corp. 32 U.S.P.Q (2d) 1087 (9th Cir.1994); Computer Associates International Inc. v Altai Inc. 23 U.S.P.Q 2d 1241 (2d Cir. 1992). Atari Games Corp. and Tengen Inc. v Nintendo of America Inc. 24 USPQ 2d 1015 (Fed. Cir. 1992); Gates Rubber Co. v Bando American Inc. 28 U.S.P.Q 2d 1503 (10th Cir. 1993)

\textsuperscript{142} Infodek Inc v Meredith-Webb Printing Co. Inc 830 F. Supp 614 (where the court held that a numerical instruction for production and assembly of card decks are copyrightable; in such cases the court will adopt the virtual identity test to establish copying)

\textsuperscript{143} GNU Business Information Systems Inc. v Social Secretary Ltd. 1993 WL 469919 (N.D. Ill 1993)
from the aesthetic appeal as does a fiction writer or a music composer. The flow chart or source code is where any person will look forward for the performance of a program. There is no copyright in a process, system, method of operation.\textsuperscript{144} Similar to a literary work in books and plays protecting exists not only the words but also their development and plot as well, in the same way non-literal elements of computer programs have been provided protection under copyright law. Hence, the structure, sequence and organisation,\textsuperscript{145} menu command structure and user interface have been protected as non-literal work in a computer programs.\textsuperscript{145}

The copyright law provides that a work of authorship should be fixed in a tangible medium of expression from which they can be perceived, reproduced or otherwise communicated. An authorship if it is put in a specific format i.e., a tangible medium of expression is said to exist, if the creative work is recorded to constitute a work of authorship. Thus, the courts now have held that most programs in machine or object code are protected under copyright law as work of authorship.

There exists a distinction between the medium of expression and the work itself. The medium may be a tape, disk or ROM and work is the program in its coded form. It is known in copyright law that the medium will never get copyright protection it is only the expression in a particular form which can be protected. So as a book itself is not protected it is only the content of the book (the expression in a particular way) is protected, the hardware also gets excluded to copyright protection. Thus, copyright affords protection only to the expressive material recorded on a particular medium.

Traditionally, copyright works required that any information or expression to humans should be communicable but the present law requires that it may be merely capable of being perceived and communicated and hence enlarging the scope of works to include object code of a computer program. Thus the object code

\textsuperscript{144} U.S C Act and the rule in \textit{Baker v Selden}, 101 U.S. 99 (1879)
\textsuperscript{145} \textit{Whelan Associates, Inc. v Jaslow Dental Laboratory, Inc}, 797 F.2d 1222 (3d Cir. 1986), cert. denied 479 U.S. 1031 (1987)
is entitled to copyright subject matter similar to a source code. However, the courts have to distinguish the protectable and unprotectable work.

An expression like a printed listing of a computer program will be infringed if it is directly copied which is not in the commonplace. This is similar to making a copy of the program on a magnetic disk or on other storage media. This is applicable to the object code version of the program contained in a silicon chip. This is known as literal copying. Any unauthorised use of such work will be liable to face action for infringement of copyright. However, when an original source code programme is written in a different programming language where the line for line comparison of the program will not exist is called the non-literal copying. Thus, making use of an existing program by inspecting it, determining the flow and structure of the program which facilitates in writing another program, intending to perform the same function, in different computer programming language is a non-literal copying. Then the question of copying, whether it was unfair to use such program or such writing is fair use and should it be allowed in public interest will have to be answered. This has been smartly referred in U.S case laws. The U.S court extends the expression of a computer program to include its structure and the sequence of operations performed by the program. Thus holding copying the non-literal work will amount to infringement of author’s right. Protection extends to reach the elements of a program which are not directly expressed but are one level of abstraction from the immediate tangible form of the computer program. Protecting computer programs object code as well as the whole “look and feel” of a computer program.

In Williams Electronics, Inc. v Artic International, Inc., Williams Electronics, Inc. was manufactures and seller of coin-operated electronic video games. The video game machine consisted of a cabinet containing, inter alia, a

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148 685 F.2d 870

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cathode ray tube (CRT), a sound system, hand controls for the player, and electronic circuit boards. The electronic circuitry included a microprocessor and memory devices, called ROMs (Read Only Memory), which was a tiny computer "chips" containing thousands of data locations which stored the instructions and data of a computer program. The microprocessor executed the computer program to cause the game to operate. Williams later designed a new video game, called DEFENDER, which incorporated various original and unique audiovisual features. The game, had symbols of a spaceship and aliens who do battle with symbols of human figures. The player could operate the flight and weapons on the spaceship, and had the mission of preventing invading aliens from kidnapping the humans from a ground plane. Williams obtained three copyright registrations in covering the computer program, covering the audiovisual effects displayed during the game's "attract mode" and covering the audiovisual effects displayed during the game's "play mode". Artie sold circuit boards, manufactured by others, which contained electronic circuits including a microprocessor and memory devices (ROMs). These memory devices incorporate a computer program which was virtually identical to William's program. The result was a circuit board "kit" sold by Artie to others and which, when connected to a cathode ray tube, produced audiovisual effects and a game almost identical to the William's game including both the attract mode and the play mode. Artie contended that there must be distinction drawn between the "source code" version of a computer program, which it would hold can be afforded copyright protection, and the "object code" stage, which could not be protected. According to Artie "copy" must be intelligible to human beings and must be intended as a medium of communication to human beings. Held, that a "copy" is defined to include a material object in which a

149 Cathode ray tube (CRT) is the biggest part of most visual display units and television sets. The screen is the front of the CRT. The CRT sends an electron beam backwards and forwards very quickly over the screen. When the beam strikes the phosphor coating on the inside of the screen, a picture is formed. Supra n 2

150 The "attract mode" refers to the audiovisual effects displayed before a coin is inserted into the game. It repeatedly shows the name of the game, the game symbols in typical motion and interaction patterns, and the initials of previous players who have achieved high scores. The "play mode" refers to the audiovisual effects displayed during the actual play of the game, when the game symbols move and interact on the screen, and the player controls the movement of one of the symbols (e.g., a spaceship), Supra n. 2

151 CONTO Report: A source code is a computer program written in any of several programming languages employed by computer programmers. An object code is the version of a program in

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work is fixed “by any method now known or later developed, and from which the work can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device.” By this broad language, it provided a broader interpretation of terms “fixation” and “copy” which encompass technological advances such as those represented by the electronic devices in this case. The court held both computer source code and objects code are protected by copyright and could not limit copyrightability of computer programs which statute clearly intended to protect. Did not accept Artic suggestion that would afford an unlimited loophole by which infringement of a computer program is limited to copying of the computer program text but not to duplication of a computer program fixed on a silicon chip. Referring to *Tandy Corp. v. Personal Micro Computers, Inc.* it came to the same conclusion (though in that case it was referring to computers rather than video games). Simultaneously referring to CONTO Report court held that, video displays are protectable subject matter. The object code of the game gets protection under copyright law. “Though there was no loophole as suggested by the court as copying a programs object code infringes the protected display under copyright law without necessarily treating the code as separately protected by copyright. One does not need to view the impulses on a videocassette as separately copyrightable in order to prevent the copying of the movie contained on the cassette. It is sufficient that the cassette constitutes a copy of a protected work.” Thus, copyright prevents copying object code regardless of whether the output of the program resembles the visual or other output of the program it copied.

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152 17 USCA, Section 101 (emphasis added)
154 The term “literary works” does not connote any criterion of literary merit or qualitative value: it includes catalogs, directories, and similar factual, reference, or instructional works and compilations of data. It also includes computer data bases and computer programs to the extent that they incorporate authorship in the programmer’s expression of original ideas, as distinguished from the ideas themselves. The House Report on the 1976 Act
3.9.2 Protection of Interface Specifications (interoperability):157

In *Apple Computer v Franklin Computer Co.*,158 Apple Computer had developed fourteen computer programs for its Apple II line of products, which Franklin Computer copied nearly verbatim all the fourteen computer programs for which a large supply of independently developed application programs (A computer that has a specific use; for e.g. a word-processing program a graphics program, or a database ) were available. When Apple Computer sued for copyright infringement, Franklin Computer defended its liability principally on the ground that operating system programs, as opposed to application programs, are not within the proper domain of copyright law. Franklin Computer made no attempt to determine which elements of the program were protectable and which were not. The court reasoned commenting on the issue of whether achieving interoperability would justify some limited copying, “The idea which may merge with the expression, thus making the copyright unavailable, is the idea which is the subject of the expression. The idea of one of the operating system programs is, for example, how to translate (in programming to convert a program from one language to another. Translation is performed by special programs such as compilers, assemblers and interpreters and in computer graphics159 to move an image in the ‘space’ represented on the display, without turning (rotating the image) source code into object code. If other methods of expressing that idea were not foreclosed as a practical matter, then there would be no merger. Franklin Computer might have wished to achieve total compatibility160 with independently

157 Interoperability- is the ability of software and hardware from different vendors, and using different operating systems, to communicate effectively, Supra n.2
159 Computer graphics- the display of pictures as opposed to only alphabetic and numeric characters, on a computer screen. It encompasses different methods of generating, displaying, and storing information. Thus it can refer to the creation of business charts and mouse pointers o the screen; or the way images are generated and displayed on the screen. Supra n 2
160 The ability of a computer to directly execute program code originally produced for another computer. This generally occurs for successive computers in a family of machines made by a particular manufacturer. Since later computers are almost always more capable (have a larger instruction set and/or more memory), a computer that is able to run a program of a less capable machine is said to be upward compatible. 2. The ability of a piece of hardware (eg. a storage device or a terminal) to be used in place of the equipment originally specified or selected. If the equipment substituted is made by another manufacturer, and fits into the computer without any modifications and works straight away, it is said to be plug compatible. “Storage device” an apparatus for recording computer data in permanent or semi-permanent form. When a distinction is
developed application programs written for the Apple II, but that would be a commercial and competitive objective which does not enter into the somewhat metaphysical issue of whether particular ideas and expressions have merged."\(^{161}\)

Thus, court gave a very expansive copyright protection for computer program.\(^{162}\)

Peter Menell is critical of this judgment as he says that "CONTU was clear that, one is always free to make the machine do the same thing as it would if it had the copyrighted work placed in it, but only by one’s own creative effort rather than by piracy. In addition, applying the merger analysis at such a high level of abstraction (where the idea of the program is how to translate source code into object code) would essentially block the development of interoperable systems, creating a powerful property right through copyright protection.”

In *Whelan Associates, Inc. v Jaslow Dental Laboratory, Inc.*\(^{163}\) the U.S 3rd Circuit Court approved the merger doctrine in assessing copyright protection for application programs. In this case, the owner of a dental laboratory hired Whelan Associates, a custom software firm to develop a computer program that would organise the bookkeeping and administrative tasks of its business. Whelan Associates interviewed employees about the operation of the laboratory and then developed a program to run on the laboratory’s IBM Series One computer. As per the terms and conditions of the contract Whelan Associates would retain the copyright in the program whereas Jaslow Dental had to put in effort to market the program. Rand Jaslow, of the Jaslow Dental laboratory, set out to create a version of the program which could run on other computer systems. Whelan Associates sued for copyright infringement. The evidence before the trial court showed that Rand Jaslow’s program did not literally copy Whelan Associate’s code, but there were overall structural similarities between the two programs. As a means of
distinguishing protectable expression from unprotectable idea, the court held that “the purpose or function of a utilitarian work would be the work’s idea, and everything that is not necessary to that purpose or function would be part of the expression of the idea. Where there are many means of achieving the desired purpose, then the particular means chosen is not necessary to the purpose; hence, there is expression, not idea.” Applying the said rule the court opined that the idea in this case was “the efficient management of a dental laboratory,” for which there are numerous ways of expressing such work. Thus, once again the court provided an expansive scope of copyright protection in this case providing idea/expression dichotomy to high level of abstraction. The courts merger doctrine was extending the scope of Section 102(b) where procedures,
processes, systems and methods of operation are excluded. Though, court did not address the computer code’s protection establishing interoperability protocols\textsuperscript{166} for computer systems\textsuperscript{167} but the analysis vastly expanded the scope of computer program being protected as copyrightable. Thus, if a computer program is independently written, there is no infringement of another program however similar may be the programs.

In \textit{Plains Cotton Cooperative Assoc. v Goodpasture Computer Service Inc.},\textsuperscript{168} court refused to follow \textit{Whelan case} that faced with a similar claim of copyright infringement which was based upon structural similarities between two programs designed to provide cotton growers with information regarding cotton prices and availability, accounting services, and a means for conducting cotton transactions electronically. Court found that, the similarities in the programs were dictated largely by standard practices in the cotton market (what the court called “externalities”), such as the “cotton recap sheet” for summarising basic transaction information, which constitute unprotectable ideas. The programs application was to assist in the marketing of cotton and this, by its very nature could only be expressed in computer programs exhibiting a substantial similar structure living no room for alternative structures.\textsuperscript{169}

be an affirmative defence to a copyright claim. Even when the defendant has failed to prove the above two defences the burden of proof to prove substantial similarity lies on the plaintiff. The plaintiff must establish two elements to claim copyright protection (a) a plaintiff must show that the general ideas are substantially similar using an extrinsic test and (b) the plaintiff must show that the expression of those ideas are substantially similar using an intrinsic test. See \textit{Sid & Marty Krufff Television Productions, Inc. v McDonald's Corp.}, 562 F.2d 1157, 1163 (9th Cir. 1977) Last visited 20/09/2010

\textsuperscript{166} An agreement that governs the procedures used to exchange information between entities in a computer NETWORK. In general, a protocol will govern the way in which information is encoded the generation of checking information, and the Flow Control of information, as well as actions to be taken in the event of ERRORS

\textsuperscript{167} The configuration that includes all functional components of a computer and its associated hardware; A basic microcomputer system includes a console, or system unit with one or more disk drives, a monitor, and a keyboard. Additional hardware called peripherals can include such devices as a printer, a modem and a mouse. Software is usually not considered part of a computer system, although the operating system that runs the hardware is known as system software, supra n 2

\textsuperscript{168} \textit{817 F.2d 1256 (5th Cir. 1987)}

\textsuperscript{169} See Bainbridge David, Software Copyright Law, 3\textsuperscript{rd} ed. Butterworth's, 1997, p 77; computer hardware are computers, monitors, printers, disc drives, CD-ROM player’s, modems, cabling and mouse etc.; the court referring to \textit{Synercom Technology, Inc. v University Computing Co.}, 462 F. Supp 1003 (N.D. Tex. 1978), In that case, Judge Higginbotham held that “input formats” of a computer program-the organisation and configuration of the information fed to the computer - were ideas, not expressions, and thus were not protected by copyright. 462 F. Supp at 1014; Judge
Even the simplest function can be performed using different algorithms and depends on how sophisticated and user-friendly the program is intended to be. Two programs used to perform the same simple function could have vastly differing structures. Thus, holding program’s application will dictate the structure of the program would be wrong. So the look and feel argument applied in Whelan was not favourably referred in the latter cases. Thus, in Whelan if defendant had put some effort when he took a short cut in developing his own program, to see that the structure is different, he would have escaped the liability. Thus, in a “look and feel” test if a programmer takes due care that the structure is different and he uses another computer program language in developing his own, will not be made liable for infringement. Whelan though criticised has been used in cases where literal copying is involved. The “look and feel” test was redefined rather than rejecting a latter case of Altai.\textsuperscript{170}

In \textit{NEC Corporation v Intel Corporation},\textsuperscript{171} NEC made a set of microprocessors to compete with those of Intel. The NEC chips contained similar programs, referred to as microcode, dealing with the same instruction set for the microprocessors. NEC chips had an extended version of the Intel microcode and were capable of operating at a faster speed. NEC had discovered the Intel microcode through reverse engineering by disassembling the code. Though, the court opined that, microcode is protected by copyright law, in this case the code was dictated by the instructions set for the particular type of micro-processor and there were no other alternatives of programming the micro-processors to handle the instruction set. The “Merger Doctrine” comes into existence, where it was held that the idea i.e. the instruction set and the expression of the idea i.e., the

\textsuperscript{170} Computer Associates International v Altai, Inc., 982 F.2d 693 (2d Cir. 1992)
\textsuperscript{171} (1989) 10 U.S.P.Q 2d

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microcode were said to have merged. Thus, when it gets merged the developer of a program will have no recourse under copyright law. This test is considered to be a restatement of what was held in Whelan case.

*Computer Associates International v Altai, Inc.* is a landmark decision in this regard, where the court expressly rejected the Whelan Associates approach in determining the scope of copyright protection for computer programs. In this case, Computer Associates, a leading developer of mainframe software, had developed a program which could operate on different IBM mainframe computers (with different operating systems). Altai developed a competing program serving a similar purpose which also operated on multiple IBM mainframes (which had access to the Computer Associates program). Altai was sued for copyright infringement. The District Court criticised Whelan's "simplistic test" for determining similarity between computer programs. The court refused to accept that there will be one idea per program. Until there are alternative ways of expressing that one idea then that particular version will be entitled to copyright protection. Similarities between two programs were also possible by external forces like the interface specifications of the operating system and demands of functionality and hence no protected code was infringed. This was a result of court determining various levels of the computer programs at issue.

The Second Circuit Court came out with a three step test known as "abstraction-filtration-comparison" test deriving the formulation from Nimmer.

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172 The Programmer may now be protected under the Semiconductor Chip Protection Act, 1984 (US) and Design Right (Semiconductor Regulations) 1989 (UK) same may be taken to India where he may get protection under Semiconductor Integrated Circuits Layout-Design Act, 2000
173 982 F.2d 693 (2d Cir. 1992)
174 Mainframe- a large computer; in the mid 1960s all computer were called mainframes, since the term referred to the main CPU cabinet. Today it refers to a large computer system, Supra n. 2
175 Interface: the point at which a connection is made between two elements so that they work with each other or exchange information. 2. Software that enables a program to work with the user (the user interface, which can be a command-line interface, menu-driven or a graphical user interface), with another program such as the operating system, or with the computer's hardware. A card, plug or other device that connects pieces of hardware with the computer so that information can be moved from place to place specification: in relation to computer hardware, an item of information about the computers components, capabilities and features. In relation to software, a description of the operating environment and proposed features of a new program, Supra n. 2
176 The court derived this formulation from Melville B. Nimmer & David Nimmer, Nimmer on Copyright, 13.03 (F) (1991); Functional Elements- Purely functional elements of a program are
The court came out with a detailed analysis to look into the infringement of copyright in computer program code. In ascertaining substantial similarity according to this test, a court would first break down the allegedly infringed program into its constituent structural parts. Then, by examining each of these parts for such things as incorporated ideas, expression that is necessarily incidental to those ideas, and elements that are taken from the public domain, a court would then be able to sift out all non-protectable material. Left with a kernel, or perhaps kernels, of creative expression after following this process of elimination, the

generally not protected under copyright law. Courts have held that elements of a user interface and the arrangement thereof are simply not protectable. Furthermore, as another example, a menu command arrangement may not be held protectable. In fact, Courts have held that the menu arrangement itself may be considered a "method of operation" rather than a protected element of expression (Infringement analysis). Given the limitations presented above, the analysis of whether substantial similarity exists between two programs has been reduced to three-tiered test. With regard to the non-literal elements of a program the test is as follows; "Abstraction"- In the *Computer Associates International v Altai, Inc*, 982 F.2d 693 (1992), decision, a seminal case on software infringement, the first strand can be summarised as follows: "In a manner that resembles reverse engineering on a theoretical plane, a court should dissect the allegedly copied program's structure and isolate each level of abstraction contained within it. This process begins with the code and ends with an articulation of the program's ultimate function. Along the way, it is necessary essentially to retrace and map each of the designer's steps -- in the opposite order in which they were taken during the program's creation (from the top down)." *Altai* at 707; "Filtration"-The second tire provides as follows: "examining the structural components at each level of abstraction to determine whether their particular inclusion at that level was 'idea' or was dictated by considerations of efficiency, so as to be necessarily incidental to that idea; required by factors external to the program itself; or taken from the public domain and hence non-protectable expression." "Comparison"- Finally, the analysis concludes with the following: "Once a court has sifted out all elements of the allegedly infringed program which are 'idea' or are dictated by efficiency or external factors or taken from the public domain, there may remain a core of protectable expression... At this point, the court's substantial similarity inquiry focuses on whether the defendant copied any aspect of this protected expression, as well as an assessment of the copied portion's relative importance with respect to the plaintiff's overall program." at 710; Literal and Non-literal elements of a programs- The source code and object code of a computer program are generally referred to as the "literal" elements of a program because they are within the literal definition of a computer program. Section 101 of the USC Act provides as follows: "a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result." The "look and feel" of a program, however, is considered more of the non-literal element of a program. As the creativity and development of the GUI of a program increased, experts began to recognise that the source code of a program was no longer the only identifiable part of the program to which one could attribute its creativity. Instead, experts began to see the unique value in the "look and feel of the interface." As a result, the courts began to find that the user interface itself was independently protectable. A number of different issues, however, have since arisen out of the same analysis. Specifically, with regard to menu command hierarchies, the courts are somewhat split as to what is or is not protected by copyright. Once again, much of the more complicated issues underlying copyright in computer programs remain unresolved. *Copyright Law Centre*, last visited 20/09/2010

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court’s last step would be to compare this material with the structure of an allegedly infringing program.\textsuperscript{177}

Brainbridge explains the “Abstraction- Filtration- Comparison" test laid down in Altai in a very lucid manner in following words:

“The new test involves three stages. The first stage is abstraction by which the non-literal elements of the program are determined by a process like reverse engineering, tracing back the programmer’s steps in the process of writing the program. This operation results in the identification of the non-literal elements (structure and other features) of varying degrees of detail. The second stage is one of filtration, filtering out the elements that are not protected by copyright. These will be those features that are unprotectable ideas, dictated by considerations of efficiency, dictated by external factors or taken from the public domain. After these elements are removed the remainder is the program’s “golden nugget.” The final stage involves a comparison of the two programs, a determination of whether the defendant had copied a substantial part of the protected expression of the plaintiff’s program.”\textsuperscript{178}

However, a question may arise as to why there must be break up of a program into three steps and then decide whether copying has occurred. The two programs may be taken as a whole and whether defendant’s program has taken substantial parts of the plaintiff’s program in deciding infringement and holding him liable. However, the U.S courts have accepted this test with full force and are followed in later cases.

This decision with the abstraction-filtration-comparison test set standards that ideas not only exist at exclusively the most abstract level but even at multiple levels of a computer program. The courts should testify that protectable elements of the computer programs are copied. Thus, the court emphasised that the ultimate comparison is not between the programs as a whole. The copyright protection did not extend to those program elements where the programmer’s “freedom to choose” is circumscribed by extrinsic considerations such as:

\begin{itemize}
\item mechanical specifications of the computer on which a particular program is intended to run
\end{itemize}

\textsuperscript{177} Computer Associates International v Altai, Inc, 982 F.2d 693 (1992) at 706
\textsuperscript{178} Bainbridge David, Software Copyright Law, 3\textsuperscript{rd} ed. Butterworth’s, 1997, p 81
compatibility requirements of other programs with which a program is designed to operate in conjunction

- computer manufacturers' design standards
- demands of the industry being serviced and
- widely accepted programming practices within the computer industry.179

The court went on to hold that external factors such as interface specifications, de facto industry standards, and accepted programming practices are not protectable under copyright law.

"It would not be infringement of copyright to copy program elements dictated by external factors such as technical, conceptual, or efficiency constraints, hardware standards and mechanical specifications of the computer on which a particular program is intended to run, software standards and compatibility requirements of other programs or hardware with which the program is designed to operate, computer manufacturers' design standards, the speed and power of the computer with which software is used, or environmental and ergonomic factors which limit the range of possible expression."180

The court should consider these external factors at the time of the allegedly infringing activities (i.e. ex post), not at the time that the first program is written. Of particular importance is that the court remarked that certain elements are uncopyrightable if they are "dictated" by "certain" factors. According to the court, these factors include public domain software, program efficiency, computer specifications, compatibility with other programs, and customer and industry demands.181 The court emphasised that the first to write a program for a particular application should not be able to "lock up" basic programming techniques as

implemented in programs to perform particular tasks."182 The Altai's abstraction-filtration-comparison test has been recognised and followed in future cases thus refusing to accept the merger doctrine adopted in Whelan case.183

In *Gates Rubber v Bando Chem. Indus., Ltd*184 the court explicitly applied the Altai's test and expanded the range of external factors to be used in filtering out unprotectable elements to include hardware standards and mechanical specifications, software standards and compatibility requirements, industry programming practices, and practices and demands of the industry being serviced.185 The court also noted that processes used in designing a computer system or components therein, e.g., modules, algorithms must also be filtered out as unprotectable u/s 102(b).186 Summarising the first two principles of abstraction and filtration to be employed in determining the scope of protection to be given to computer programs and the final step of comparison used in ultimately assessing substantial similarity the court opined that:

"First, in order to provide a framework for analysis, we conclude that a court should dissect the program according to its varying levels of generality as provided in the abstractions test. Second, poised with this framework, the court should examine each level of abstraction in order to filter out those elements of the program which are unprotectable. Filtration should eliminate from comparison the unprotectable elements of ideas, processes, facts, public domain information, merger material, *scenes a faire* material, and other unprotectable elements suggested by the particular facts of the program under examination. Third, the court should then compare the remaining protectable elements with the allegedly infringing program to determine whether the defendants have misappropriated substantial elements of the plaintiff's program."

The court expressed that the abstractions test will necessarily vary from case to case and program to program. The court declined to set forth any strict methodology for the abstraction of computer program as complexity is involved and the computer technology is ever-changing. However, suggested that, ordinarily

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182 982 F. 2d at 712 (quoting Peter S. Menell, *Analysis of the Scope of Copyright Protection for Application Programs*, 41 Stan L. Rev. 1045, 1087 (1989))
184 9 F.3d 823 (10th Cir. 1993)
185 See also *Mitel v Iqtel*, 124 F.3d 1366, 1375 (10th Cir. 1997)
186 *Gates Rubber Co. v Bando American Inc.* 28 U.S.P.Q. 2d 1503 (10th Cir.1993)
a computer program can often be analysed into at least six levels of generally declining abstraction, i.e. the main purpose; the program structure or architecture; modules; algorithms and data structures; source code and object code.\textsuperscript{187}

In \textit{Bateman \& Mnemonics Inc.}\textsuperscript{188} the court held it may not be that, the interface specifications are uncopyrightable as a matter of law. Following \textit{Altai} case held that, “external considerations such as compatibility may negate a finding of infringement”\textsuperscript{189} and said that “it is particularly important to exclude methods of operation and processes from the scope of copyright in computer programs because much of the content of computer programs is patentable. Were we to permit an author to claim copyright protection for those elements of the work that should be the province of patent law, we would be undermining the competitive principles that are fundamental to the patent system.”\textsuperscript{190}

3.9.3 Permissibility of Reverse Engineering\textsuperscript{191}

One more major concern in a computer program is the test as to what extent the development of interoperable computer systems concerns is restricted or stalled by providing copyright protection. In the sense will the competing manufacturers be debarred from going for reverse engineering and if permitted how they will be able to reverse engineer a computer system to determine the codes which govern the interoperability?\textsuperscript{192}

\textsuperscript{188} 79 F.3d 1532 (11th Cir. 1996)
\textsuperscript{189} \textit{Bateman \& Mnemonics, Inc.}, 79 F.3d 1532, 1540 (11th Cir. 1996) at 1547; In an accompanying footnote, the court commented: Note that we use the word “may.” Such a finding will depend on the particular facts of a case, and thus it would be unwise for us to try to formulate a bright-line rule to address this issue, given the importance of the factual nuances of each case. In no case, however, should copyright protection be extended to functional results obtained when program instructions are executed and such results are processes the type better left to patent and trade secret protection.
\textsuperscript{190} \textit{Computer Associates International v Altai, Inc}, 982 F.2d 693 (1992)
\textsuperscript{191} “Reverse engineering” is a method of analysing a product in which the finished item is studied to determine its makeup or component parts, for example studying a completed ROM chip to determine its programming or studying a new computer system to learn about its design. For computer software, reverse engineering typically involves de-compilation of a substantial portion of the object code and studying the resulting decompiled code. ‘ROM’- Basic- short for read only memory. Beginners All purpose Symbolic Instruction Code. A basic interpreter stored in ROM (read only memory) so that the user can start programming after simply turning on the machine without having to load Basic from a disk or tape. ROM Basic was a feature of many early home computers. Supra n. 2
\textsuperscript{192} See generally Pamela Samuelson \& Suzanne Scotchmer, \textit{The Law and Economics of Reverse}
Most computer software is distributed in the object code form only, which is not directly readable by humans. If a software manufacturer is able to prevent competitors from learning the interface specifications necessary for interoperability because of more general restrictions on the copying of program code containing the protocols, then the fact that the protocols are not protectable under copyright law would be nugatory since competitors would be precluded from learning the interoperability protocols. In some contexts, a computer program can be understood through input/output testing\(^{193}\) or other means for example, physically and chemically peeling the layers of a chip and studying the design of the chip with a microscope, that do not require the making of copies of the computer code in which the protocols are embedded. In most circumstances however, the only feasible means of deciphering the protocols governing interoperability is disassembly\(^{194}\) of the program, which involves translating the machine-readable binary object code into a form intelligible to human being.\(^{195}\) Thus, any such making of copies or translations is an infringement, which will entail the protocols under the circumstances will effectively be copyrightable.

The USCA was amended in 1980, implementing the CONTU recommendations and permitted any owner having a copy of a computer program to make another copy or adaptation of the program for the purpose of running\(^{196}\) the program on a computer.\(^{197}\) In *Vault Corp. v Quaid Software Ltd.*,\(^{198}\) Vault, the manufacturer of a computer program designed to prevent unauthorised duplication

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\(^{193}\) The complementary tasks of gathering data for a computer or a program to work with, and of making the results of the computer’s activities available to the user or to other computer processes; Gathering data is usually done with input devices such as the keyboard and the mouse, while the output is usually made available to the user via the display and the printer. Other data resources such as disk files and communications ports for the computer, can serve as either input or output device. Supra note 2

\(^{194}\) Assemble-in programming to convert an assembly language program to equivalent machine language instructions called object code. Supra n. 2


\(^{196}\) Run-to execute a program i.e. to carry out the program instructions. A program or part of a program that is currently being executed by the processor (or processors) is said to be running or active. Only one program or program section can be running at any one instant on a processor. 2. The act of executing a program, a set of programs, or some part of the program. Supra n. 2

\(^{197}\) 17 USCA Section 117

\(^{198}\) 847 F.2d 255 (5th Cir. 1988)
of another program on the same diskette (floppy disk), alleged that Quaid had infringed its copyright in the copy protection program by loading it into its computer’s memory for the purpose of reverse engineering the copy-protection device so as to circumvent it. Vault argued that Section 117 of the USCA did not authorise such copying of the program because it was not for the “intended purpose” of running the program. The court declined to construe Section 117 so narrowly on the ground that the statutory language did not contain any such restriction. In addition to providing authority for making copies of computer software as a means for using the program within a computer loading the program into the internal memory of the computer, the courts have allowed others some freedom to make copies and translations of object code for the purpose of knowing and studying the working and operation in turn to develop interoperable products.

In *Atari Games v Nintendo*, Nintendo had created a video game console in a computer program which protected its access. Atari Games by deciphering the interface specifications developed a different computer code enabling its games to

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199 Ibid at 261
200 Ibid, where the company making the intermediate copies is not an “owner,” then the authorization to make internal copies does not apply. See *MAI Systems Corp. v Peak Computer, Inc.*, 991 F.2d 511 (9th Cir. 1993), cert. dismissed, 501 U.S. 1033 (1994). It seems apparent, however, that licensees may properly invoke § 117. See David Nimmer, Elliot Brown & Gary N. Frischling, *The Metamorphosis of Contract into Expand*, 87 Cal. L. Rev. 17 (1999).
201 To place information from storage into memory for processing, if it is data, or for execution, if it is program code, Supra n. 2
202 Primary storage- Random access memory (RAM); the main general-purpose storage region to which the microprocessor has direct access; A computer’s other storage options, such as disks and tape, are called secondary storage or sometimes backing storage. Supra n. 2
204 975 F.2d 832 (Fed Cir. 1992)
205 Video game console- a control unit, such as a terminal, through which a user communicates with a computer; In microcomputers, the console is the cabinet that houses the main components and controls of the system, sometimes including the screen, the keyboard, or both. With the MS-DOS operating system, the console is the primary input (keyboard) and primary output (screen) device, as evidenced by the device name CON through proprietary interface specifications embedded in software pertaining to code or a command that is built into its carrier. For example, application programs insert embedded printing commands into a document to control printing and formatting. Low level assembly language is embedded in higher-level languages, such as C, to provide more capabilities or better efficiency, Supra n. 2
run on Nintendo’s video game console. However, this was a non infringing element of a computer program. Nintendo filed a copyright infringement action against Atari Games contending that in the process of decompilation\textsuperscript{206} of the Nintendo computer code Atari had copied the protected element of a computer program. The U.S Court of Appeals for the Federal Circuit held that an author cannot acquire patent-like protection by putting an idea, process, or method of operation in an unintelligible format and asserting copyright infringement against those who try to understand that idea, process, or method of operation.\textsuperscript{207} It may be appropriate of making intermediate copies with a purpose of decompiling a computer program of an author. The court reasoned that, “the fair use doctrine will permit an individual in rightful possession of a copy of a work to undertake necessary efforts to understand the work’s ideas, processes, and methods of operation.”\textsuperscript{208} Further holding “when the nature of a work requires intermediate copying to understand the ideas and processes in a copyrighted work, that nature supports a fair use for intermediate copying. Thus, reverse engineering object code to discern the unprotectable ideas in a computer program is a fair use.”\textsuperscript{209} However placing certain limitations on reverse engineering of an object code the court held it would be permitted only fulfilling the following conditions:

- “Any reproduction of protectable expression must be strictly necessary to ascertain the bounds of protected information within the work.”\textsuperscript{210}
- “Reverse engineering does not authorise commercial exploitation of “protected expression””\textsuperscript{211}
- “To invoke the fair use exception, an individual must possess an authorised copy of a literary work.”\textsuperscript{212}

Since Atari Games had acquired a copy of Nintendo’s source code under

\textsuperscript{206} Compile- to translate all the source code of a program from a high level language into object code prior to execution of the program; Object code is executable machine code or a variation of machine code. More generally compiling is sometimes used to describe translating any high-level symbolic description into a lower-level symbolic or machine-readable format. A program that performs this task is known as a compiler; Decompiler- a program that attempts to generate high-level source code from assembly language code or machine code. This can be a difficult task, as some assembly language code has no corresponding high-level source code, Supra n. 2

\textsuperscript{207} Atari Games v Nintendo, 975 F.2d at 842

\textsuperscript{208} Ibid. at 842, See Consensus Statement, supra note 64, at 23-25

\textsuperscript{209} Ibid. at 843

\textsuperscript{210} Ibid. (emphasis added)

\textsuperscript{211} Ibid. at 844

\textsuperscript{212} Ibid. at 843 (emphasis added)
false pretences (by misrepresentation) to the Copyright Office that Atari Games was defending a copyright infringement action and it would use the source code only in putting on its defence, the court refused to allow Atari Games use of the equitable defence of fair use.\textsuperscript{213}

The U.S 9\textsuperscript{th} Circuit in \textit{Sega Enterprises Ltd. v Accolade, Inc.}\textsuperscript{214} wherein Accolade made intermediate copies of the Sega software in the process of deciphering the interface specifications for the Sega system. Sega was the owner of a video game console who brought infringement action against and to prevent Accolade from developing games which could operate on their hardware during the process which had made intermediate copies. The court considering Atari Games held fair use is a defence in an action for infringement of copyright and such intermediate copying are excused under law. It is to be noted that, the final product however, did not infringe any protectable computer program. Sega had sued on its copyright in the console system software. The court following \textit{Atari case} held that, a person with an authorised copy of the work creating interoperable works cannot be treated to be unfair and was permissible. “To hold otherwise will give the owner of the copyright a de facto monopoly over the functional aspects of his work which will constitute an attempt to monopolise the market through copyright by making it impossible for others to compete which runs counter to the statutory purpose of promoting creative expression and cannot constitute a strong equitable basis for resisting the invocation of the fair use doctrine.”\textsuperscript{215}

Peter Menell says that presently the applicable law by courts is that “copyright law does not stand in the way of achieving interoperability at the level of hardware-hardware, hardware-software, or software-software interface

\textsuperscript{213} Ibid, at 841
\textsuperscript{214} 977 F.2d 1510 (9th Cir. 1993)
\textsuperscript{215} Sega Enterprises Ltd v Accolade Inc, 977 F.2d 1510 (9th Cir. 1993) 1526 See also Brief Amicus Curiae of Copyright Law Professor, Sega Enterprises Ltd v Accolade Inc, 977 F.2d 1510 (9th Cir. 1992) (No. 92-15655), reprinted in 33 Jurimetrics J. 147 (Fall 1992). See Cohen; Consensus Statement; and CONTU Report “Copyright protection for programs does not threaten to block the use of ideas or program language previously developed by others when that use is necessary to achieve a certain result. When other language is available, programmers are free to read copyrighted programs and use the ideas embodied in them in preparing their own works.” The Ninth Circuit reinforced and expanded this doctrine in Sony Computer Entertainment, Inc. v Connectix Corp., 203 F.2d 596 (2000), cert. denied, 531 U.S. 871 (2000)
specifications.” Any users involved in the development of interoperable products, who do not want to risk the copyright action by the owners are adopting the “clean room” process. The process normally is to avoid the copying from a protected computer code in their products.216 Hence, courts have been providing leeway to the users going for reverse engineering in taking the intermediate copies of protected computer program code to understand the operational aspect and in that way determining interfaces specification which may enable to develop interoperable programs.217

3.9.4 Protection for Menu Command Hierarchies

The USCA while defining the computer program had specified that it is “set of statements or instructions to be used directly or indirectly in a computer and the certain results”218 The courts had to consider in this regard whether ‘certain results’ in the definition will protect the behaviour of the program such as the screen displays and menu command structures.219 However, it should be noted that, the so called behaviours of the program fulfils the statutory requirements of copyright law and hence are protectable as different programs can produce the same behaviour as in interface specifications and screen displays.220 “… Decision here does not control infringement actions regarding categorically distinct works, such as certain types of screen displays. These items represent products of computer programs, rather than the programs themselves, and fall under the copyright rubric of

216 A clean room procedure involves using two sets of computer engineers - one to decompile the target program to determine the interface specification and a second team that does not have access to the target program which develops the interoperable program solely on the basis of the interface specifications- to ensure that the final product does not contain any infringing code (and that the development team can prove that they independently developed their code). Copyright lawyers have developed detailed procedures for ensuring the integrity of this process. See Davis, Scope of Protection of Computer-Based Works: Reverse Engineering, Clean Rooms and Decompilation, 370 PLI/Pat 115, 151 (1993); A room in which dust and other small particles are filtered from the air and in which protective clothing is worn to avoid contaminating electronic components and other delicate sensitive equipment, Supra n. 2
217 See, e.g., Bateman v Mnemonics, Inc., 79 F.3d 1532, 1540 (11th Cir. 1996) (following Sega Enterprises Ltd v Accolade, 977 F.2d 1510 (9th Cir. 1993); Computer Associates Int'l, Inc. v Intel Corp., 982 F.2d 693, 700, (2d Cir. 1992); NEC Corp. v Intel Corp., 10 U.S.P.Q.2d 117 (N.D. Cal. 1989); E.F. Johnson Co. v Uniden Corp. of America, 623 F. Supp. 1485, 1501 n.17 (D.C. Minn. 1985); however, decompilation can be laborious, time-consuming, and expensive. See Johnson-Laird, supra note 13
218 USCA, Section 101
220 Supra n. 1
audiovisual works. 221 Thus, courts have limited the protection of command systems governing the operation of a computer program though did not differentiate between copyright protection for the computer code and the “certain results that they generate.

In *Lotus Development Corp. v Paperback Software Int'l*, 222 The Lotus Corporation, after a successful implementation of VisiCalc program which was developed for the Apple II computer, vigorously went ahead with an enhanced and speedier operating spreadsheet program adopting majority of VisiCalc’s features and commands into its 1-2-3 program for the IBM PC platform. 223 It was a huge success and completely led the market by adopting this program. Thus, spreadsheets running on IBM and IBM compatible machines, knowledge of the program became popular in the accounting and management arena. The Lotus 1-2-3 command hierarchy provided more than 200 commands with logical structuring enabling users in development of customised programs to automate particular accounting and business planning functions in their workplace (called “Macros”). 224 Lotus 1-2-3 command hierarchy became the human capital investments in learning the system. This was to be cautiously dealt with those who had to enter into the spreadsheet market at this juncture including providing a better improved technology over the Lotus 1-2-3 command hierarchy. 225 Paperback Software emulated the operation of the Lotus 1-2-3 product and

221 See *Computer Associates International v Altai, Inc*, 982 F.2d 693 (1992) at 703
224 Lotus 1-2-3 is a spreadsheet program that enables users to perform accounting functions electronically on a computer. Users manipulate and control the program via a series of menu commands, such as “Copy,” “Print,” and “Quit.” Users choose commands either by highlighting them on the screen or by typing their first letter. In all, Lotus 1-2-3 has 469 commands arranged into more than 50 menus and submenus. Lotus 1-2-3, like many computer programs, allows users to write what are called “macros.” By writing a macro, a user can designate a series of command choices with a single macro keystroke. Then, to execute that series of commands in multiple parts of the spreadsheet, rather than typing the whole series each time, the user only needs to type the single pre-programmed macro keystroke, causing the program to recall and perform the designated series of commands automatically. Thus, Lotus 1-2-3 macros shorten the time needed to set up and operate the program.
developed a VP-planner with the spreadsheet program. However, they took caution not to copy the Lotus 1-2-3 program code. Lotus sued Paperback Software alleging the violation of copyright where Paperback had copied the 1-2-3 menu structure, including choice of command terms, the structure and order of those terms, their presentation on the screen and the long prompts. Following the merger test of *Whelan* case, remedy was granted for Lotus focusing simply on the elements that could be expressed in a variety of ways. However, Paperback Software went for an out of court settlement without any appeal.\(^{226}\) The court held that, a menu system gets protection under copyright law.

In *Lotus Development Corp. v Borland Int'l, Inc.*\(^{227}\) Borland had developed its first Quattro program after five years of Lotus 1-2-3 program. This program was far superior to the existing programs including Lotus 1-2-3. Borland included in its Quattro and Quattro Pro version 1.0 programs "a virtually identical copy of the entire 1-2-3 menu tree."\(^{228}\) There were enormous innovations over competing spreadsheet products. Borland copied only the words and structure of Lotus menu command hierarchy without taking or copying any computer code by itself. Borland included the Lotus menu command hierarchy in its programs to make them compatible with Lotus 1-2-3 so that spreadsheet users who were already familiar with Lotus 1-2-3 would be able to switch to the Borland programs without having to learn new commands or rewrite their Lotus macros. so by activating the Emulation\(^{229}\) interface, Borland users would see the Lotus menu commands on their screens and could interact with Quattro or Quattro Pro Version as if using Lotus 1-2-3, even though with a different looking screen and with many Borland options not available on Lotus 1-2-3. This in turn allowed Borland users in choosing as to how they wanted to communicate with Borland's spreadsheet

\(^{227}\) 49 F.3d 807 (1st Cir. 1995)
\(^{228}\) Borland III, 831 F. Supp. at 212 (emphasis in original)
\(^{229}\) The imitation of all or part of one computer system by another computer system such that the imitating system executes the same programs, accepting the identical data and producing the identical results (but not necessarily in the same way) as the system imitated. A device or program used in producing emulation is called an emulator. Emulator- hardware or software designed to make one type of computer or component act as if it were another. By means of an emulator, a computer can run software written for another machine. In a network, microcomputers might emulate terminals in order to communicate with mainframes, supra n. 2
programs, i.e., either by using menu commands designed by Borland or by using the commands and command structure used in Lotus 1-2-3 augmented by Borland added commands. It also offered a new interface for its users who actually preferred over the macro interface. As macro had substantial users it thought of offering and operational mode based on the 1-2-3 command structure as well as macro compatibility. Unlike VP-Planner, Borland’s visual representation of the 1-2-3 command mode substantially differed from the 1-2-3 screen displays.

Borland brought a declaratory suit to know the position of its computer program. This case was clubbed with the *Lotus Development Corp. v Paperback Software Int’l case* and the lower court refining Whelan test of merger found in favour of Lotus. By the time Borland went in appeal the *Altai decision* had been decided and few courts had already adopted the three prong test of “abstraction-filtration-comparison.” The *Atari Games case* and *Sega case* had given the ruling legitimising the development of interoperable systems through reverse engineering. The case of *Feist Publication Inc. v Rural Telephone Service Co.*, had held that there cannot be copyright protection for any alphabetically organised telephone directories as there is lack of originality and denied the “sweat and brow” test which were adopted till then.

The U.S First Circuit held that subject matter in this case is a method of operation which is excluded by the statute by Section 102(b) of the USCA. The court was of the opinion that the menu command hierarchy not protectable as it was considered to be a system, process or procedure. The court substantiated by stating:

“We think that method of operation, as that term is used in section 102(b), refers to the means which a person operates something, whether it be a car, a food processor, or a computer. Thus a text describing how to operate something would not extend copyright protection to the method of operation itself. Other people would be free to employ that method and to describe it in their own words. Similarly, if a new

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230 *Lotus Dev. Corp. v Borland Int’l, Inc.*, 49 F.3d 807 (1st Cir. 1995)
231 499 U.S. 340 (1991), The Supreme Court of U.S in *Feist* held that factual work exhibiting originality as a compilation will not be protected. Hence to seek copyright protection the author should fulfill the requirement of originality and it is only the expressions of work and not facts which will be able to claim copyright, ibid
232 *Lotus Dev. Corp. v Borland Int’l, Inc.*, 49 F.3d 807 (1st Cir. 1995)
method of operation is used rather than described, other people would still be free to employ or describe that method. We hold that the Lotus menu command hierarchy is an uncopyrightable method of operation. The Lotus menu command hierarchy provides the means by which users control and operate Lotus 1-2-3. If users wish to copy material, for example, they use the ‘Copy’ command. If users wish to print material, they use the ‘Print’ command. Users must use the command terms to tell the computer what to do. Without the menu command hierarchy, users would not be able to access and control, or indeed make use of, Lotus 1-2-3’s functional capabilities. The Lotus menu command hierarchy does not merely explain and present Lotus 1-2-3’s functional capabilities to the user; it also serves as the method by which the program is operated and controlled.” 233

In Altair case, court was dealing with the protection of programming code and not the results of such code and was distinguished. The Supreme Court of U.S granted Certiorari and approved the First Circuit decision.

The case of MiTek Holdings Inc. v ARCE Engineering Co., 234 gave a similar opinion but with a different reasoning. In this case the copyright owner having application program designed and arranged wood trusses for the framing of building roofs. The defendant made a competing program featuring similar menu command tree and user interface. The 11th Circuit court held that such menu and submenu command structure of the truss design program would not be protected under copyright law as it involves a process. Further held that, the menu and submenu command structures being not original thus merging the idea expression “programs mimic the steps a draftsman would follow in designing a roof truss plan by hand and the logical design sequence is akin to a mathematical formula that may be expressed in only a limited number of ways; to grant copyright protection to the first person to devise the formula effectively would remove that mathematical fact from the public domain.” 235

In Mitel, Inc. v Iqtel, Inc., 236 Mitel had a computer system which automatically selected the telephone long distance carrier and remotely activated...

233 Ibid at 815
234 89 F.3d 1548 (11th Cir. 1996)
235 Ibid at 1556-57
236 124 F.3d 1366 (10th Cir. 1997)
optional telecommunications features including the speed dialling. Iqtel was sued as they started using the command codes which were identical. Iqtel product included its own set of command codes and compatible mode of Mitel Translation Mode. Holding that such command codes failed to have a minimum degree of creativity could not claim copyright protection. It also cannot be granted on the ground of *scenes a faire* doctrine as they are largely dictated by external factors including compatibility requirements and industry practices.\(^{237}\)

Thus, the courts have refused to grant copyright to the menu and submenu command structure, command codes as it involves a process or procedure not protected by law and there is no infringement either taking into consideration the merger doctrine or the *scenes a faire* doctrine.

### 3.9.5 Protection for Computer User Interfaces

The computer has to work with many other input or output devices. This interface between the computer and user includes the keyboard, mouse, joystick, interactive pen, disk drives, audio equipment, microphone and screen displays. They are considered to be functional works. Thus, they being functional elements of a computer they are not protected under the copyright law. Thus, keyboards, pointing objects, speaker and any other hardware instruments cannot claim protection under the copyright law. Data input formats for e.g. the order and size of data fields do not get copyright protection.\(^{238}\) The visual images and text of screen displays may qualify as audiovisual, graphic, or literary works under copyright.\(^{239}\)

In the beginning of 1980s courts have provided substantial protection to elements of a user interface. In *Broderbund Software Inc. v Unison World* \(^{240}\) holding that the choice of typeface\(^{241}\) on user screen display and choice of works “Choose a Font” as the title for a screen for producing cards, brochures, and other printing projects were examples of audiovisual displays “dictated primarily by

\(^{237}\) Ibid. at 1374-76  
\(^{238}\) *Feist Publication Inc. v Rural Telephone Service Co.* 499 U.S. 340 (1991) at 350  
\(^{239}\) See, e.g., *Stern Electronics, Inc. v Kaufman*, 669 F.2d 852 (2d Cir. 1982)  
\(^{240}\) 648 F. Supp. 1127, 1134 (N.D. Cal. 1986)  
\(^{241}\) It is a complete set of characters that has a particular design. There are thousands of different typefaces. The typeface can be changed for changing the look of the document. E.g. Times New Roman, Courier, Bodoni, etc., Supra n. 2
artistic and aesthetic consideration, and not by utilitarian or mechanical ones.” In Digital Communications Associates Inc. v Softklone Distribution Corp., finding that the arrangement of status screens and commands for a data communication program are protectable expression. In these two cases, the court applied both the merger doctrine and the standard of Baker v Selden fulfilling the originality test under the statute. As a result of the network features of computer-human interfaces, many aspects of these works cannot claim copyright protection.

In Data East USA Inc. v Epyx Inc., a video game consisting of a karate match was the subject seeking a copyright protection. The manufacturer of this program sued the defendants providing competing game with similar audio and visual elements. The court refused to grant remedy holding that similarities flowed as they are constrained and inherent in the sport of karate itself. Court filtering out the unprotectable ideas, held a ‘virtual identity’ in determining the competing work would not infringe copyright.

In Apple Computer Inc v Microsoft Corp, Apple filed copyright infringement action against Microsoft Corporation (Microsoft) and Hewlett-Packard Company (HP), claiming that Microsoft’s Windows 2.03 computer software and HP’s NewWave computer software infringed seven copyright’s held by Apple. The copyright at issue was the audiovisual works that Apple claimed for the graphical user interface (GUI) of its Macintosh computer. The litigation arose as to whether an earlier version of Microsoft’s software, Windows 1.0, infringed Apple’s copyrights. Microsoft and Apple sought to put that dispute to rest by an agreement. Apple granted to Microsoft a non-exclusive licence of the audiovisual displays in Windows 1.0. However, the court opined that, the Agreement was not a complete defence to this action, because it was limited to the visual displays in

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243 Supra n. 1
244 862 F.2d 204 (9th Cir. 1988)
245 Ibid at 209; See also Interactive Network v NTN Communications, 875 F. Supp 1398 (N.D. Cal. 1995), aff'd 57 F.3d 1083 (Fed. Cir. 1996) finding that football video game was not infringed because similarities between works were based on the rules of football and the idea of an interactive prediction game.
Windows 1.0 and did not cover displays in Windows 2.03 that were not in the prior work. The court had to determine allegedly infringing Windows 2.03 and NewWave visual displays that were not contained in Windows 1.0 and to facilitate comparison of the works and the scope of copyright protection. Apple was asked to submit a list of alleged similarities between its works and the works of Microsoft. Apple filed this list containing 189 alleged similarities between the Apple audiovisual works and Windows 2.03 and 147 similarities between the Apple works and NewWave. The court then determined that as per the Agreement, 179 of the similarities claimed to be in Windows 2.03 were licenced, and that the agreement would cover all but 54 of the similarities alleged to be in NewWave, assuming of course that HP established that Microsoft in turn licenced these features to it. After filing a supplemental complaint that extended its claims to cover Windows 3.0 and NewWave 3.0, the updated versions of the Microsoft and HP works, Apple then filed two supplemental lists of similarities, incorporating the prior lists by reference.

The court held, copying of Microsoft's Windows's operating system and HP's NewWave operating system infringed Apple's copyright in the desk-top GUI for its Macintosh computer system. The court held that, licencing agreement will not be a complete defence to the copyright claims and examined the scope of copyright protection for a large range of audiovisual elements of computer screen displays. The District Court applying the virtual identity standard comparing the works as a whole held that, the elements of the GUI were not protected on the

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249 Apple Computer, Inc. v Microsoft Corp., 759 F. Supp. 1444 (N.D.Cal.1991), Apple alleged that Microsoft licensed to HP, for use in NewWave, the visual displays in both Windows 2.03 and 3.0, allegations which both defendants admitted and which HP asserts are uncontested. Letter of J.A. Marshall, June 22, 1992. Apple apparently has recently had second thoughts about its allegations of a Microsoft/HP license, claiming now that HP's discovery responses on this subject have been "evasive," although it is not clear that Apple is withdrawing its allegations.
250 A visual computer environment that represents programs, files and options with graphical images, such as icons, menus, and dialog boxes on the screen; the user can select and activate these options by pointing and clicking with a mouse or, often with the keyboard. A particular item (such as a scroll bar) works the same way to the user in all applications, because the GUI provides standard software routines to handle these elements and report the user's actions (such as a mouse click on a particular icon or at a particular location in text, or a key press); applications call these routines with specific parameters rather than attempting to reproduce them from scratch (GUI), supra n. 2

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grounds, they lacked originality and were not protected under the statute or doctrine of *scenes a faire* \(^{251}\) or the merger doctrine or due to the limited number of ways in which an idea could be expressed or the external constraints imposed by the computer system. In this case the similarities between Apple’s works and Microsoft’s Windows (not authorised by the licencing agreement) were not protectable. The court came to the conclusion that, by filtering out the unprotectable elements by dissection to determine the protectable elements in a specific work, no infringement of copyright had occurred. This was affirmed by Appellate Court.\(^ {252}\) The court characterised Apple’s desktop-based user interface as serving a purely functional purpose and held that the similarity of these functional elements did not suggest unlawful copying but standardisation across competing products. There would only be infringement if the alleged copy is virtually identical. The effect of this decision is that competitors are allowed to incorporate the same functions in their programs provided they use different ways to represent those functions on the screen. This decision therefore indicates that courts are inclined to restrict the copyright protection available to non-literal elements, especially to user interfaces.\(^ {253}\) Thus, it can be seen that many elements of the GUI of a Desktop remains in the public domain. Similarly, the limitation on copyright protection given to desk top user interface is due to the originality

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\(^{251}\) “*Scenes a faire*” Under the doctrine referred to as “*Scenes a faire*” any “expressions” that are standard, stock, or common to a particular topic are excluded from copyright protection under the statute. For example, in the realm of film, certain plots are considered so common that they are no longer protectable. While a screenplay itself may be protected under copyright law, the underlying theme may not. Similar to the realm of film, there are certain features or functions in a software program that are considered so common that they are no longer protectable. As such, the factor of originality once again plays a significant role in the copyright protection analysis. The *Scenes a faire* doctrine is also used in the computer context to deny protection to expression dictated by “extrinsic” factors or “externalities” which limit or constrain the programmer’s choices. In addition, the same doctrine limits copyright protection that is dictated by or dependent upon extrinsic factors to the software program which have the effect of causing limitation the choice of the programmer. The Second Circuit has identified the following as examples including, “(1) the mechanical specifications of the computer on which a particular program is intended to run; (2) compatibility requirements of other programs with which a program is designed to operate in conjunction; (3) computer ‘manufacturer’s design standards; (4) demands of the industry being serviced; and (5) widely accepted programming practices within the computer industry.” Clearly then, the concept can apply in an expansive fashion. Copyright law Centre, last visited 20/09/2010

\(^{252}\) *Apple Computer Inc v Microsoft Corp*, 35 F.3d 1435 (9th Cir. 1994), cert. denied 513 U.S. 1184 (1995)

requirement and functionality doctrines under copyright law.254

3.10 Copyright Protection Computer Software in United Kingdom:

United Kingdom accepted computer programs are to be considered as literary works later than it was internationally adopted. Even the courts began to recognise computer programs as literary work.255 However, the European Council defines the term ‘computer program’ shall include programs in any form, including those which are incorporated into hardware; whereas this term also includes preparatory design work leading to the development of a computer program provided that the nature of the preparatory work is such that a computer program can result from it at a later stage.256 In United Kingdom copyright protection to computer software or programs was recognised and referred only through the Copyright (Computer Software) Amendment Act 1985.257 However, it provided that it shall afford protection to a computer program in any form and expressed in any form.

CDPA defines literary, dramatic and musical works as:

- “Literary work” means any work, other than a dramatic or musical work, which is written, spoken or sung, and accordingly includes:
  - a table or compilation other than a database,
  - a computer program,
  - preparatory design material for a computer program, and
  - a database

In a claim for copyright protection, publication of a work is an essential part. A brief reference to in this context is made to understand its effect on digital media. Publication in the context of internet has to be examined in view of the

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254 MiTek Holdings, Inc. v ARCE Engineering Co., Inc., 89 F.3d at 1558 also applying the virtual identity standard for claims of software infringement in a computer-user interface based on a compilation of uncopyrightable elements held “the menu and submenu command structure of the truss design program was uncopyrightable under section 102(b) of the US Copyright Act because it represents a process.”


257 CDPA, Section 3
definition given in Berne Convention.258 The term publication is normally said to be published when two essentials are fulfilled (a) the presence of copies and (b) the availability of copies to satisfy the reasonable requirements of the term public. In the context of internet there is publication, when it is made with the above two conditions being fulfilled. However, when an unpublished work is transmitted through internet, publication is said to have occurred when the copy is stored on the website and made public when the work is accessed through the website. Works are made available at the location of the website. Whenever an access is made and at each point it is accessed it may be said it simultaneously gets published, which fulfils the meaning of publication under Article 7 (8) of the Berne Convention.259 However, the term publication in the context of internet faces one major problem. When any work is said to be published over internet it will be very difficult to trace the first publication as dissemination may take place simultaneously at different points. And similar situation arises when it is published in analog form and in internet. The determination of where the publication first took place in analog form or on the internet is a question which will be difficult to apply.260 The domestic laws provide that, the publication is said to be done when it is first issued or communicated to the public. And thus, when publication takes place it may be said to be taking place in different places at the same time. Sterling suggests doing away with the publication requirement by just fulfilling the protection afforded to the authors including the term of work.261 The term publication also gets a confused meaning when a work is made “available on demand” where we may say is it made available and not publication.

258 Article 3 (3) The expression “published works” means works published with the consent of their authors, whatever may be the means of manufacture of the copies, provided that the availability of such copies has been such as to satisfy the reasonable requirements of the public, having regard to the nature of the work. The performance of a dramatic, dramatico-musical, cinematographic or musical work, the public recitation of a literary work, the communication by wire or the broadcasting of literary or artistic works, the exhibition of a work of art and the construction of a work of architecture shall not constitute publication.

259 Article 7 (8) In any case, the term shall be governed by the legislation of the country where protection is claimed; however, unless the legislation of that country otherwise provides, the term shall not exceed the term fixed in the country of origin of the work.

260 Section 3 Copyright Act, 1957. Meaning of publication-For the purposes of this Act, “publication” means making a work available to the public by issue of copies or by communicating the work to the public.

Copyright law does not protect the computer programming languages. But a computer program which is written in a programming language, using the commands, instructions and structure of the language are by itself capable of copyright protection. Conceptualisation and development of the programming language by any person will not get a right in restricting any programs written using the language. However, the programs used to interpret or compile programs written using the language will certainly be protected under copyright law. Applying the basic principle the books and manuals describing the language, its use and structure will get copyright protection. But, idea once again can be taken from the original works and developing a new work is not restricted. Language being a tool to express idea, by itself is not protected whether it being a natural language or computer language. Hence, there may be ideas which can be taken from a program but expression in original will get it through the test of copyright law. The manuals and any other documents in addition to interpreter and compiler programs are protected and can claim copyright.

Copyright law never intended that literary work should always be with literary merit or style. It refers to the nature of the work, that is one which is expressed or conveying by means of words. In *University of London Press v University Tutorial Press Ltd.*,262 it was held that a literary work covers work expressed in print or writing, irrespective of the question whether the quality is high, and that the word literary refers to written or printed matter. The only requirement is that, it must be original expression of thought fixed in a tangible medium or form. So a literary work is something which is intended to afford another pleasure in the form of literary enjoyment or which is intended to convey information or instruction through the medium of writing, speech or song. In *Exxon Corporation v Exxon Insurance Consultants International Ltd*263 it was held that, the words are used to describe works which are expressed in print or writing. As already seen in the previous chapter literary work must be original (ideas being excluded from protection) and is fixed in a specified form. Originality requirement

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262 (1916) 2 Ch. 601
263 (1982) Ch. 119
means no more than a work must be the product of the author's own skill, labour, judgment and capital. Skill, labour and judgment merely in the process of copying cannot confer originality and thus a copyist who merely copies a work cannot have protection for his copy. There must be some element of material alteration or further skill and labour which suffices to make totality of the work as original work.\textsuperscript{264} It is to be noted that quality of the alteration is more important than the quantity of work. In the case of literary work the form of literary expression is the significant element of originality. Even though, the work is not novel or any person working could have produced the same result, the author expending sufficient independent skill, labour and judgments of his/her own will justify the protection to the copyright work. The work should be looked at as a whole in determining whether the work is original.

It can be seen that a literary, dramatic, musical or artistic works may be generated by computer where there is no human author of the work in ordinary sense. In such circumstances the author is to be taken as the person by whom the arrangement necessary for the creation of the work are undertaken.\textsuperscript{265} There is no change in the authorship in a computer program. The general rule applies in this case. Even if a computer program is written by different persons at different level for e.g. one may be responsible for the overall structure of the program and another in creation of detailed coding. Similarly, computer programs are written in different programming languages of which some may be with high level language. This high level of inbuilt intelligence may be carried through into the final program by use of terms from the language. In such case Section 9(3) of the CDPA, as referred above will be applied.

The computer program has both the source code and the object code. The object code is machine readable and cannot be seen by human. The question of

\textsuperscript{264} \textit{Interlego A G v Tyco Industries Inc.} (1989) A C 217
\textsuperscript{265} CDPA, Section 9(3) Section 9 provides for who is an author - (1) "author," in relation to a work, means the person who creates it. 9 (3) In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken. Cited at Copinger and Skone James on Copyright, by Kevin Garnett, Gillian Davies and Gwilym Harbottle, 15th Ed. 2005, Vol. 1, p 134
work's tangibility had been considered in *Cox v Riley*\(^{266}\) where an employee erased computer programs from a magnetic card. The court held that, magnetic card though not tangible property had been destroyed by employee to such an extent that the employer could not use or had to re-program and therefore the employee would be liable for damaging the property under criminal law. However, reasoning given cannot be justified, as magnetic pulses that represent the program, though invisible to the naked eye exist.\(^{267}\) The Computer Misuse Act 1990 in U.K now provides that a deliberate erasure or modification of computer programs or data are breach of law and will be punishable. A work though does not convey any information to the ordinary reader and which is written in code is writing and is protected even though it may mean nothing to the person unless he has the key to these codes.\(^{268}\) A work of which the only embodiment or record is a digital one stored in computer memory, and which cannot be appreciated without the aid of suitable equipment is still considered as a literary work.

In U.K the first case which imported the look and feel doctrine was *John Richardson Ltd v Flanders* on non-literal copying.\(^{269}\) Richardson wrote a computer program using the BASIC programming language to produce labels attached to prescribed drugs (e.g. containing the person's name, the name of the drug, date and instructions on how to use the drug etc.) Flanders who was working with Richardson later wrote the program in assembly language for the BBC microcomputer. When Flanders wrote a program in QuickBasic for the IBM microcomputer program, Richardson who was working on IBM version of its program sued Flanders for infringement of copyright. There was no literal similarity between the programs, as one being in assembly language and the other in QuickBasic. Thus, the court had to consider the non-literal elements such as structure, sequence, input and output formats and routines, facilities and options. The court held that, Flanders were liable for infringement of copyright in few elements of computer programs when found with substantial similarities in the line

\(^{266}\) (1986) 83 Cr. App R 54
\(^{268}\) *Anderson (D.P.) & Co Ltd v The Lieber Code Co.* (1917) 2 K.B. 469 (words were made up without any inherent meaning)
\(^{269}\) (1993) FSR 497
editor, amendment routines and dose codes. When considering the question of substantiality, the court stated that firstly, the similarities between the two programs should be considered individually, and secondly, it should be considered whether the entirety of what was compared represented a substantial part of the plaintiff’s program. After evaluating all the functions performed by the two programs, and the manner in which they were carried out, the court concluded that copying had occurred in only 2 of the alleged 17 points of similarity. Though this case is criticised for not applying the Altai test but, the court in U.K for the first time brought the U.S doctrine of look and feel test and said that a non-literal work of a computer program is protected under copyright law. In this regard Ferris J held that:

“There is thus nothing in any English decision which conflicts with the general approach adopted in the *Computer Associates* case. I think that in preference to seeking the “core of protectable expression” in the plaintiff’s program an English court will first decide whether the plaintiff’s program as a whole is entitled to copyright and then decide whether any similarity attributable to copying which is to be found in the defendant’s program amounts to the copying of a substantial part of the plaintiff’s program. This was the approach which was held to be correct in the *William Hill* case. But at the stage at which the substantiality of any copying falls to be assessed in an English case the question which has to be answered, in relation to the originality of the plaintiff’s program and the separation of an idea from its expression, is essentially the same question as the United States court was addressing in *Computer Associates*. In my judgment it would be right to adopt a similar approach in England.”

In *Sega Enterprises Ltd v Richards*\(^{270}\), plaintiff developed a computer game which was produced by the defendant on similar program installing it on circuit boards as a replacement for boards in games machines. When sued for interlocutory injunction it was contended by defendant that computer programs were not protected by copyright law. However, it was held, that copyright subsisted in the assembly code version of the program, which is a source code and the object code is either a reproduction or an adaptation of the source code version and hence protected as copyright.

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\(^{270}\) (1983) FSR 73
It was actually an Australian Case of *Apple Computer Inc v Computer Edge Pty Ltd*,\(^\text{271}\) which led to development of computer programs as copyright protectable under English law. Apple claimed that ‘Wombat’ computer included read-only memory chips\(^\text{272}\) that embodied infringing copies of Apple’s operating system programs. The court concluded that a reader may have got instruction and information from reading the source codes, which “express meaning as to the arrangement and ordering of instructions for the storage and reproduction of knowledge” and an operating system program might be viewed as a “work which is expressed in printing or writing irrespective of whether it has an excellence of quality or style, literary merit, taste, judgment or ingenuity. It is sufficient if the work supplies information capable of conveying an intelligible meaning and if mental effort and industry is expended in its preparation...” Thus, recognising the computer programs comply with essential principles of copyright like quantitative standard of authorship, no element of “literary quality” was required to support a claim of copyright. The object code versions of the programs were protected as translations of the source code versions. The court further observed that, transliteration may more precisely explain what happens, but this is plainly comprehended within translation. This term doubtless normally suggests translation from one language to another but its ordinary meaning is wider and it is necessary to apply it with due regard for modern technology. Object code is essentially a mechanical translation of the source programme into another language. The computer adds no creative element to the source programme. Given the source programme the object code version is predetermined by it. “Object code is not a mysterious language which only computers can read. It is a language devised and developed by persons skilled in computer science which they can read and indeed translate into various computer languages...” It was held, that as a literary work is intended to “afford either information and instruction, or pleasure, in the form of literary enjoyment” is protectable, the object code of computer


\(^{272}\) Memory Chips- Random Access memory RAM) chips contain from a couple of hundred thousand to several million storage cells (bits). They are the computer’s working storage and require constant power to keep their bits charged. Firmware chips such as ROMs, PROMs, EPROMs etc are permanent memory chips that hold their content without power. Supra n. 2
programs in the ROM chips in the Apple II were protected as copyright. Though, the High Court held protection did not extend to machine readable versions of computer programs. However, the copyright law as stands amended in Australia now covers even the object code of a computer programs. Copyright Act, 1968 (as amended in 1984).\textsuperscript{273} However, this decision led to the U.K court to accept and adopt the computer program as literary works including the source and object code.\textsuperscript{274}

A program which instructs a computer to perform the desired operation often goes through a series of evolutionary steps from preliminary conception to detailed and complex expression. In this process a crucial stage in the conception is the expression of the basic steps to be executed, i.e. the algorithm, in the form of flow-chart or other logical flow diagram. Thereafter the statement of instructions in a computer language is relatively unskilled though it may be very laborious. The detailed writing may be so called “high-level” language such as FORTRAN or COBOL, giving the program in source code. The computer itself then converts this into operational terms of object code, by means of a separate system control program.\textsuperscript{275} The work must fulfil the test of sufficient labour, skill and judgment test to be treated as original literary work. The ‘idea’ put into ‘expression’ is copyright protected by looking into various circumstances.\textsuperscript{276}

In \textit{IBCOS Computers Ltd v Barclays Mercantile Highland Finance Ltd}, Poole an employee of IBCOS was involved in accounts package for agricultural dealers and when he joined Barclays developed a competing package. It was a disk to disk copying which was covering even the identical mistakes of ‘remark’ lines in some of the programs and the presence of the same redundant lines of code in

\begin{footnotesize}
\begin{enumerate}
\item[273] Australia enacted the Australian Copyright (Amendment) Act, 1984 holding that computer programs are protected under copyright law as literary works very shortly after this decision. Bainbridge David, \textit{Software Copyright Law}, 3rd ed. Butterworth’s, 1997, p-42
\item[274] CDPA Section 3 (2) Copyright does not subsist in a literary, dramatic or musical work unless and until it is recorded, in writing or otherwise; and references in this Part to the time at which such a work is made are to the time at which it is so recorded. Section 178 “writing” includes any form of notation or code, whether by hand or otherwise and regardless of the method by which, or medium in or on which, it is recorded, and “written” shall be construed accordingly. Section 178 “computer-generated,” in relation to a work, means that the work is generated by computer in circumstances such that there is no human author of the work
\item[275] Cornish p 763
\item[276] \textit{Ibcos Computers v Barclays Mercantile Highland Finance}, (1994) F.S.R 275
\end{enumerate}
\end{footnotesize}
both suites of programs.277 Holding Barclays liable for infringement for 28 programs of IBCOS and the structure of the entire package of program being copied (package being compilation) substantiated that, when general accounts package for agricultural dealers were marketed which consisted of around 335 programs with 171 record layout files and 46 screen layout files would constitute a compilation both in the individual programs and in the entire software package. When there is sufficient skill, labour and judgment in selecting and arranging the individual programs in the compilation the law protects not only the individual programs but also the whole suite of programs considering it as a compilation. This is nothing but protecting the look and feel of computer programs.278 The subject matter of protection of a computer program is the language or code written by programmer, the design and the structure of the program.279 It seeks to include a computer program of source code as well as other forms. Importantly, the court recognised that, copyright protection must extend beyond the literal aspects of the program code to aspects of “program structure and design features.” After a comparison of the latter features, the court found that a substantial part had been taken and had therefore no hesitation in finding infringement. Both the John Richardson and the IBCOS cases show that the U.K courts acknowledge the subsistence of two copyrights in computer programs i.e. firstly in the code and secondly in the non-literal elements with the help of following words:

“It is submitted that the guiding rule is fairly simple and was stated succinctly by Hall VC 120 years ago in a judgment of great authority. “The true principle in all these cases is that the defendant is not at liberty to use or avail himself of the labour which the plaintiff has been at for the purpose of producing his work; that is, in fact, merely to take away the result of another man’s labour or, in other words, his property.” By ‘labour’ is understood, of course, substantial mental labour. The question “Did the defendant use a substantial amount of the plaintiff’s hard mental work instead of doing his own?” is readily

277 A remark line is a label or other note inserted by the programmer and which is not executed by the computer. When compiling a source code program into object code remark line are ignored and do not appear in the object code. The purpose of remark lines is to help the programmer understand the program and the function of the various parts of the program, making it easier to modify the source code program in the future. Bainbridge David, Software Copyright Law, 3rd ed. Butterworth’s, 1997, p 59
278 (1994) F.S.R. 275
intelligible, and subject to a rule of reason. The onus of showing that he did ‘over borrow’ lies on the plaintiff, of course.\textsuperscript{280}

However, in IBCOS case the distinction between the U.K and the U.S law could be identified. The U.K follows the limited requirement of originality and even going with protecting the functionality of the computer program to an extent. Deviating from \textit{Feist Publication} Case of the U.S compilations of information can be protected in the U.K. Even Australian courts have followed the U.K model of protecting the fact.\textsuperscript{281} Simple programs which fail to have sufficient labour skill and judgment may be protected if they are not copied and hence, a program may pass the test protection over its content.

Computer program is entitled to copyright protection, if it is stored in any form when it is in writing or otherwise. The word writing included any form of notation or code, whether by hand or otherwise and regardless of the method by which or the medium in or on which it is recorded.\textsuperscript{282} Thus, it covered any form of computer storage applicable to computer program itself and any literary works other than computer programs in a digital form. Computer programs or file stored on magnetic media or hard wired into a computer did not cause any dispute in law. So, when it is stored on a disk or printed on a paper it will constitute a recorded copy. But, if the literary work in a computer program exists only in a transient manner in a Random Access Memory (RAM) which is a volatile memory, the question rose as to its protectability. It is said that there must be some permanency greater than volatile memory to claim copyright protection.

In \textit{Bookmakers Afternoon Greyhound Services Ltd v Wilf Gilbert (Staffs) Ltd.}\textsuperscript{283} the court held that, copyright subsists in the lists of greyhounds in races, displaying these lists on its display monitors, and when defendant reproduced these lists with material forms was protected and infringement of copyright in the program occurred. Copying in relation to a literary, dramatic, musical or artistic

\textsuperscript{281} Desktop Marketing Systems v Telstra (2002) 119 F.C.R 491
\textsuperscript{282} CDPA, Section 178
\textsuperscript{283} (1994) FSR 723
work, means reproducing the work in any material form. This includes storing the
work in any medium by electronic means. Thus, copying includes making
transient copies. Any work is said to be copied when there is reproduction of the
work in any material form in any medium including electronic means. Even taking
the work and recording in volatile memory of a computer RAM where loading it
into a computer memory will be a reproduction in material form and any
unauthorised use will be an infringement.

The law is getting clearer by recognising computer program as literary work.
However, the test remains the same, i.e. the work must be original, expressed in a
particular form and in writing or otherwise which includes writing in electronic
means. If the computer programmer has created the work with his skill, labour and
judgment shall be considered as original work if it is created without copying a
previous computer program. As already referred it need not be of high quality but
the work is a result of minimum of skill and judgment. Excluding the de minimis
rule where very trivial, insignificant and very small works may not be protected
under copyright law, all other work even if it is small program gets protected. For
e.g. requesting the name of a person or giving instruction to print a document may
be considered by courts as de minimis which does not afford copyright protection.

In *Microsense Systems Ltd v Control Systems Tec. Ltd* it was held that,
original work where skill, labour and judgment are used in devising the operational
aspects of a traffic signal controller in determining whether the list of mnemonics
which were used to program the controller was work entitled to get protection if
any preparatory work has been recorded in any form of expression. Similarly, the
protection for programs making up a computer’s operating system and the
instruction set of the central processor unit sometimes referred as micro-program
or microcode such programs which are defining element of the computer which is

284 CDPA, Section 17 (2) Copying in relation to a literary, dramatic, musical or artistic work means
reproducing the work in any material form. This includes storing the work in any medium by
electronic means.
285 unreported, June 17, 1991 U.K
dictated by computer's architecture and design philosophy and concepts should be protected under copyright law.\textsuperscript{286}

Computer programs like flowcharts and drawings showing layouts for screens are protectable under copyright if it stands the test of originality. The term literary work includes inter alia a computer program and preparatory design material for a computer program. David Brainbridge says it was not necessary to include preparatory design material to be included as it was already protected in their own right as literary or artistic works as appropriate.\textsuperscript{287} Computer programs are in many cases a collection or suite of numerous individual programs. In addition, to protection for each individual program, copyright may also exist in the collection of programs as a compilation.\textsuperscript{288}

The only difference between the U.S and the U.K copyright law is that former specifically provides in the statute that ideas are not protectable copyright where in latter case it can be only inferred from the statement that work must be in writing or otherwise, which conveys the same meaning.

Thus, copyright law as discussed in the previous chapter does not protect the ideas only. If an idea is expressed in a tangible form, a computer program is protected by copyright law. Further, it is the expression embodied in the work which is protected and idea may still be copied freely by any other persons. Hence the courts in the U.S and the U.K and in other countries have accepted that computer programs are copyright protectable and in such cases there are certain exception which can be considered to be fair use, like use for interoperability or reverse engineering and thus, would not amount to infringement of copyright or permitted acts.

\textsuperscript{286} Bainbridge David, \textit{Software Copyright Law}, 3\textsuperscript{rd} ed. Butterworth's, 1997, p 2-3; computer hardware are computers, monitors, printers, disc drives, CD-ROM player's, modems, cabling and mouse etc.

\textsuperscript{287} Brainbridge David, \textit{Software Copyright Law}, 3\textsuperscript{rd} ed. Butterworth's, 1997, p 52

\textsuperscript{288} Ladbroke (Football) Ltd v William Hill (Football) Ltd. (1964) 1 All ER 465 though not directly related to computer programs held fixed odds football coupons comprising lists of matches to which different wagers were appended was protectable as compilation. The same analogy can be drawn in relation to a computer programs.
3.11 Uncertain Future in Computer Software Law

The approach of courts in limiting the copyright protection dissecting the three step test of Altai, led the computer software industries in seeking protection under the innovation concept of patent law. However, the distinction between idea and expression is not a concluded test with computer programs as there is no clear cut answer for the same and probably will never have. The tests laid down in Altai or the Lotus case may be only of guiding the decision making but not to determine whether a particular element of a computer program is copyright protected. So an uncertainty in this regard has led the computer software industries to seek cover under different laws.

Taking an example, the U.S courts simultaneously granted patent protection to the computer software once there is fulfilment of the test laid down under patent law. In Diamond v Diehr, where Diehr had filed a patent application claiming invention for a process for moulding raw, uncured synthetic rubber into cured precision products. It was possible, by using well-known time, temperature and cure relationships, to calculate by means of an established mathematical equation when to open the moulding press and remove the cured product. According to Diehr, the industry had not been able to measure precisely the temperature inside the press, thus making it difficult to make the necessary computations to determine the proper cure time. Diehr characterised their contribution to the art to reside in the process of constantly measuring the temperature inside the mould and feeding the temperature measurements into a computer that repeatedly recalculates the cure time by use of the mathematical equation and then signals a device to open the press at the proper time. The Supreme Court of U.S held that, the claim was eligible for patent protection under Section 101 Patent Act. Industrial processes such as Diehr’s claims for transforming raw, uncured synthetic rubber into a

289 Diamond v Diehr 450 U.S. 175 (1981) (holding that a claim to a process for curing rubber that involved the use of a computer to calculate a mathematical equation constituted patented subject matter); see State Street Bank & Trust v Signature Financial Group, 149 F.3d 1368 (Fed. Cir. 1998), cert. denied, 525 U.S. 1093 (1999)

290 Pp 1053-1059, which provides for the issuance of patents to “whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof...”
different state or thing are the types which have historically been eligible to receive patent-law protection.291

Another way, the software companies have adopted is with a special contract called as “Shrink-wrap” and “Click-Wrap” licencing contracts where they can directly get the protection with the user of that software which had turned out to be economical and effective in regulating the user.292 Thus, industries have

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291 Pp. 1053-1055. For purposes of Sec. 101, a “process” is “an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery... The machinery pointed out as suitable to perform the process may or may not be new or patentable.” Referring Cochran v Deener, 94 U.S. 780, 788, 24 L. Ed. 139; Industrial processes such as Diehr’s claims for transforming raw, uncured synthetic rubber into a different state or thing are the types which have historically been eligible to receive patent-law protection. Pp. 1053-1055. Diehr’s do not seek to patent a mathematical formula, but instead seek protection for a process of curing synthetic rubber. Although their process employs a well-known mathematical equation, they do not seek to pre-empt the use of that equation, except in conjunction with all of the other steps in their claimed process. A claim drawn to subject matter otherwise statutory does not become non-statutory simply because it uses a mathematical formula, computer program, or digital computer. Diehr’s claims must be considered as a whole, it being inappropriate to dissect the claims into old and new elements and then to ignore the presence of the old elements in the analysis.

292 Software licenses generally take several different forms. A common form is called a “shrink-wrap” licence also called “tear-open” licences. This form of license is usually printed on the outside of the package containing the disks holding the actual software program. It usually states that the user agrees to all terms of the licences by breaking the seal and taking out the disks, and that if the user does not agree to all the terms, he or she can return the software for refund (Some manufacturers have included cards for the purchaser to sign and return by mail, often for both licencing and registration purposes. However, these cards are rarely returned). The terms of the licence, usually written in small print, generally places limitations on the use and copying of the software, and also disclaims warranties. Shrink-wrap licences have come under fire in some courts as adhesion contracts or as not conforming to the UCC, and their enforceability is currently somewhat in question (Vault Corp. v Quaid Software Ltd., 847 F.2d 255 (5th Cir. 1988); But see, ProCD, Inc. v Zeidenberg, 86 F.3d 1447, 29 U.C.C. Rep. Serv. 2d (CBC) 1109 (7th Cir. 1996), finding that shrink-wrap licences are enforceable unless their terms are objectionable on grounds applicable to contracts in general, Computers and Copyright Law, infringement, cumulative supplement, American Jurisprudence Proof of Facts 3d Database updated January 2007, last visited 12th Feb, 2007 However, this situation does not appear to have affected the almost ubiquitous use of shrink-wrap licences, because of their economic sense. Another form is the sign-on licence, which is often used with software downloaded off the Internet. This licence appears as a screen or window when the software is first booted up (transferred from the hard drive or other storage medium to the computer’s RAM and opened on-screen), and requests that the user agree to the licence terms before proceeding to use the program. This form of licence is sometimes called “click wrap” licences, and is also sometimes used when multiple programs are included on the same CD-ROM. See Tannenbaum, Current Topics in Software Licensing, in Advanced Seminar on Licensing Agreements 217 (Practicing Law Institute 1998); A variation on click wrap licences is the electronic contract. An electronic registration form containing the licence terms appears when the program is installed or the first time it is booted up. The user is usually asked to type his name and a registration number onto the form signalling his or her assent to the terms. The completed form is transmitted electronically to the vendor. After receipt, the vendor electronically informs the user that he or she is authorised to use the software. There have been some complaints about whether such paperless contracts constitute enforceable agreements. Future case law will undoubtedly shed
started moving away from seeking copyright protection and finding a way of protection under other law. Hence, the law governing the computer software has found some uncertain future and the time will see whether we continue to protect it under the copyright law. The possibility of a sui generis law also may not be ruled out in the future. However, all these development have made industries or the users under confusion as to the law governing the computer software. As it exists today, the U.K and India do not provide protection of computer software under patent law and it only gets cover under the copyright law. The computer program protected under copyright law is considered as literary work and thus, entitling the author with certain exclusive rights or the restricted act, the right granted to recoup the economic benefit for his skill, labour and judgment. These rights are granted in almost all the countries. Even the international law provides these rights through the Berne Convention, the TRIPS Agreement, the WCT and WPPT, which the researcher will turn to make an attempt to study in the next chapter.

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more light on the enforceability of electronic contracts and other forms of mass market software licencing.