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FORMATION OF LEGAL PROTECTION OF COMPUTER SOFTWARE BY THE RULES OF COPYRIGHT AND PATENT LAW



Introduction. Computer programs (CP) are one of the newest objects of intellectual property. Neither the norms of copyright or patent law, nor attempts to develop separate legislation have enabled creating a legal mechanism that would not cause significant complaints from stakeholders.

Problem Statement. An analysis of the historical factors that led to the choice of different approaches to the legal protection of computer programs enables to better understand the system in each country, to choose the most appropriate ways to acquire the rights and protection of these objects of intellectual property, to defend their property and non-property rights, and to look for new, more reasonable and efficient ways of solving problems in this field.

Purpose. To study the world history of the formation and development of legal protection of computer software by the rules of copyright and patent law.

Materials and Methods. Critical review of literary sources on intellectual property and computer science, comparative analysis of international and national legislation of various countries, study of judicial practice that has had the greatest impact on the practical solution to the problem of protecting computer programs.

Results. The main stages in the history of the development and formation of ways of legal protection of computer programs have been identified and characterized. Intellectual property and computer sciences materials, international and national legislation of different countries, jurisprudence, the most important historical events and outstanding inventions in this field have been analyzed. The dominant position of the computer program copyright protection has been established not always to correspond with the rights and interests of their authors who increasingly support the introduction of alternative, patent and legal protection of computer programs by special legislation rather than by the precedent law.

Conclusions. It has been proposed to introduce a hybrid copyright-patent way of CP legal protection, which would combine the advantages of both methods, as a compromise solution to the problem of competition between the CP legal protection by means of the copyright and patent law.

Keywords: legal protection of computer programs, copyright, and patent law.

Society is constantly evolving in scientific, technical and cultural spheres and over time, this process has been markedly accelerating. Among the consequences, there is the emergence of fundamentally new objects of the creative activity,

which until recently were just a dream of individual researchers, science fiction writers or storytellers. In particular, not long ago there have appeared photos, audio, and video records, broadcasting programs, integrated circuits, computer programs, databases, and so on. The appearance of these objects has prompted researchers search

ching the optimal mode of their legal protection. Most of them are easily integrated into the existing system and are properly protected by making minor amendments to the existing legislation or drafting special laws, which do cause much debate in society.

However, this is not the case for the situation with computer programs. None of the existing intellectual property institutes has been able to fully meet the demands of society and software developers. Neither the copyright nor the patent law, nor the attempt to develop a special law has enabled creating a legal mechanism that would not cause any significant complaints of stakeholders. Different countries choose various approaches to legal protection, which have been constantly changing, contradicting each other, and still causing controversy between software developers, software corporations, researchers, lawyers, and related professionals and industries.

Analyzing the historical factors behind the choice is crucial because it makes it possible to better understand the system in each country, to choose the most appropriate ways to acquire the rights and to protect computer programs, property and non-property rights, and to search new more justified approaches to solving the problems in this area. The problems are extremely urgent in today's world as the number of computer programs and their economic, social, and legal impact on all areas of human life is growing rapidly. Trends in the legal protection of computer programs are constantly changing under the influence of new challenges and are reflected in court decisions that often respond to the situation faster than the law. To understand these problems, it is advisable to study their origin and various ways for their solutions.

The purpose of this research is to retrace the world history of the creation and development of legal protection of computer programs by the copyright and patent law. For this purpose, literature sources on intellectual property and computer sciences have been analyzed, international and national legislation of different countries ha-

ve been studied, and the case law having the most notable influence on the practical solution of the problem of protection of computer programs has been scrutinized. Particular attention is paid to the analysis of American scholarly research literature and jurisprudence, since, on the one hand, this country is an undisputed leader in software development and, on the other hand, it has the most distinctive legal system that essentially differs from the European one, to which the Ukrainian system is rather similar.

The first mechanical device controlled by a binary circuit was Joseph Marie Jacquard loom (1804) [1] that used pasteboard cards with punched holes, each card corresponding to one row of the design. The hole on the card corresponded to unity, while unpunched space represented binary zero. Multiple rows of holes are punched in the cards and the many cards that compose the design of the textile are strung together in order [2]. Using this machine enables creating very sophisticated patterns.

Jacquard's invention had a profound influence on Charles Babbage who is considered the pioneer of computer technology. Starting with the 1810s, he was working with machines that could calculate astronomical, navigation, and mathematical datasheets. In 1833, he started creating an analytical machine that became a prototype of a modern computer.

In 1840, Babbage was invited to Turin, where he gave lectures about his machine. Luigi Menabrea, a lecturer at the Turin Artillery Academy and future Prime Minister of Italy, created and published a synopsis of his lectures in French. Later, Ada Lovelace (George Byron's daughter) translated these lectures into English, supplementing them with comments larger than the main text. In the comments, Ada described the algorithm for calculating Bernoulli numbers using the Babbage analytical machine. This description is considered to be the first published algorithm, with Ada Lovelace sometimes called the first programmer [3, 4]. Ada programming language created on behalf of the U.S. Department of Defense was

named for her [5]. However, Babbage's analytical machine was never completed. The main reasons for this were the total lack of funding and a low level of technology development at that time.

In 1936, Alan Turing proposed an abstract "universal Turing machine" that could be considered a model of a general-purpose computer [6]. It had an infinitely long read / record tape and was able to move it, changing its contents by performing the algorithm.

In 1938, the German engineer Konrad Zuse developed the binary mechanical calculator Z1, and in 1941 upgraded it to the Z3 version. Many researchers consider the latter to be the first operating programmable computer. For the next version Z4, Zuse developed the first ever high-level programming language Plankalkul. In particular, the first chess program was written in this language. Because of wartime, he could have published information about Plankalkul as late as in 1948 [7].

In 1939, at the University of Iowa, Professor John Vincent Atanasoff and graduate student Clifford Berry created the first computer without moving parts (ABC, Atanasoff-Berry Computer). The computer was successfully tested in 1942, but when Atanasoff was called to the field forces, further studies were stopped [8]. These works were not widely known at that time.

For a long time, ENIAC (Electronic Numerical Integrator and Computer) developed and patented by J. Presper Eckert and John Mauchly was considered the first computer [9]. It was completed in 1945, and its programming took 2 months [1]. This computer was operating successfully for many years and was finally shut down in 1955. However, in 1973, a landmark event in the protection of the substantive objects of computer law took place. By virtue of court decision, Eckert and Mauchly's patent was revoked, while Atanasoff-Berry's computer was recognized as the world's first one.

The first computer built on the principle of shared storage of data and programs in memory was the Manchester Small-Scale Experimental

Machine (SSEM) created in 1948, and the first program for it was written by Tom Kilburn [10].

It should be noted that the software for the first computers essentially differed from the modern programs, because each program was developed specifically for that computer and had no value separately from it. However, since the 1950s, the commercialization and widespread use of standard computer architectures had led to the emergence of unified software that could run on multiple computers and be reinstalled many times.

As a result, the legal protection of computer software was getting more and more relevant. However, because of the fundamental difference between the computer programs and the conventional intellectual property, it was not obvious which of the existing legal mechanisms, patent or copyright, would be most appropriate for the protection of the intellectual property of program developers.

The analysis of literary sources, the international and national legislation, and the case law has allowed us to highlight certain stages in the history of development of legal protection of computer software.

In **the first stage** (late 1950s – mid 1960s), the computer programs were an integral part of the computational tools for which they were developed. So, their illegal use was impossible and meaningless. However, at that time, the IBM System/360 line was released. It consisted of six computers, each with the same command architecture. These computers could run several programs at once [11]. The legal aspects of the creation and use of computer programs were governed mainly by the contract law and the commercial secret law.

However, already at this stage, the copyright and patent law started to be applicable. In November 1961, in the United States, the computer program was registered for the first time ever. As a result of the practical consideration of the number of applications, the United States Copyright Office has issued Circular No. 61 Copyright Regist-

ration of Computer Programs. It should be noted that the necessary condition for registration was the presence of original elements of compilation, selection, location, and text expressions [12].

One of the first cases of obtaining copyright protection documents for a computer program can be considered the application for invention No. 622397 filed on November 15, 1956, by Robert Washburn Tripp [13]. Subsequently, it was divided into two applications for US patents US3058657 *Variable speed drive interpolation system for automatic machine control* and US3066868 (A) *Interpolation computing system for automatic tool control*. The patents were issued on October 16 and on December 4, 1962, respectively. Under different names the invention was also patented in Belgium, Switzerland, France, the United Kingdom, and the Netherlands (we could not have found the date of issue of the patent number NL215849 in the last country). The earliest patent was issued in France, FR1174079 (01.11.1958, published 05.03.1959). Therefore, this patent can be considered the first known patent for a computer program.

Another example of software patent protection is British Patent Application 19463/62 of May 21, 1962, *A Computer Arranged for the Automatic Solution of Linear Programming Problems* [14, 15]. Its authors, Patrick Vincent Slee and Margaret Joyce Harris Pauline, got several patents for their inventions in the United Kingdom (GB1039141), Austria, Belgium, the Netherlands, and France in 1963–1966.

It should be noted that some publications, such as Wikipedia, state that the first software patent was granted to Martin Goetz. In 1964, he developed an improved data sorting algorithm that enabled saving time for executing the program by reducing the number of read/record operations and the time for rewinding the magnetic tape [16]. M. Goetz filed a patent application on 09.04.1965 and received U.S. patent US3380029 *Sorting System*. *Computerworld Magazine* reported, "First Patent Issued for Software, Full Implications Are Not Yet Known" [17].

The second stage lasted from the mid-1960s to the mid-1970s. It was characterized by the emergence of independent software vendors. Manufacturers started to separate software products from hardware, differentiating their pricing accordingly. At that time, both copyright and patent law applied to the legal protection of software products. The object of protection was either a new way of controlling a computer or a new application of a computer.

In May 1964, the U.S. Copyright Office announced the start of accepting computer programs for registration. In April 1965, the Presidential Commission was organized to develop recommendations for reforming the patent system. As a result, computer software was concluded to be patent ineligible. In 1966, the Patent Office published provisional guidelines according to which some algorithms were recognized as patent eligible [12].

About 100 patents for algorithms and programs were issued in the United States in 1970–1972, and various patent formulas were tested. In most cases, applications for device were also accompanied by independent applications for method of its control (including the data processing method), sometimes there were also applications for computing program describing the operation of the algorithm [18]. These inventions were referred to a separate class in the U.S. Patent Classification (444-1).

In the third stage (until the end of the 1970s), in most advanced economies, the development of legal protection for computer programs was characterized by strengthening the copyright position regarding the legal protection of this intellectual property object. At the same time, the patent law was used as well, but mainly in court decisions. This was facilitated by the decision of the U.S. Supreme Court in *Gottschalk v. Benson* case, which reviewed the Court of Customs and Patent Appeals at the suit of Benson and Tabott, where the subject of patenting was algorithm for decoding decimal into binary numbers formulated as method [19]. The Court concluded that the method

described in the application was a mathematical solution, so, it was not patent eligible under the applicable law, and the extension of patent protection beyond the scope of the applicable law was outside the competence of the courts and could be made exclusively by the U.S. Congress.

At the fourth stage (1980s – mid 1990), the development and distribution of desktop computers caused an explosive growth in software trade. Computer programs became a valuable commodity that was not directly dependent on hardware. Ways for fast copying applications and convenient means for saving and transferring information appeared. There were attempts to develop specific legislation on the legal protection of computer programs, but they did not give expected results because of the lack of time to adapt it to the current conditions. Meanwhile, countries the computer software developers were further adapting the copyright law to protecting the intellectual property in question [20].

At this time, copyright protection was considered the preferred means of protecting intellectual property related to software.

In 1978, the World Intellectual Property Organization (WIPO) endorsed the Model Guidelines for the Protection of Computer Software. These guidelines consisted of nine sections containing definitions of basic terms, fundamental titles to software, conditions of their origin, and duration (the intellectual property law deals with the term "duration"), possible compensation, etc. In addition, the possibility of making a relevant international agreement on the protection of computer programs was considered. However, in none of the WIPO countries these Guidelines became the framework for developing and adopting specific legislation [12].

In its report for 1979, the National Commission on New Technological Uses of Copyrighted Works (CONTU) chose copyright as the most appropriate form of protection for software. The U.S. Congress accepted the Commission's position as "computer program" was incorporated into the Copyright Act, in 1980 [21].

In 1980–1985, similar amendments to the legislation were made in Great Britain, France, Hungary, Japan, and other countries.

The early court cases, starting with *Gottschalk v. Benson*, supported the U.S. Patent Office's (USPTO) initial position stating that software algorithms were not patent eligible. However, during that period, court decisions changed for the sake of software protection.

In 1981, in the *Diamond v. Diehr* and *Diamond v. Bradley* cases, the court made the decision that enabled patenting computer algorithms [22, 23].

The *Diamond v. Diehr* case concerned a method for controlling a press for shaping rubber products using a digital computer. As a result of the examination, this application was rejected insofar as the computer-implemented sequence of actions was patent ineligible based on the *Benson* case. However, the Court of Customs and Patent Appeals reversed that judgement, arguing that the patent eligible invention could not become patent ineligible just because it used a computer. The Court was upholding its initial position that mathematical formulas were not patent eligible in their abstract form, but machines or processes in which mathematical algorithms were used differed from algorithm as such. Thus, if the invention as a whole met the conditions of patent eligibility, it was subject to patenting, even if it incorporated a software component [18].

The Courts and the U.S. Patent Office supported the trend established by the judgment in the *Diamond v. Diehr* case.

In the fifth stage (since the early 1990s and up to the present time), there has been a steady growth of networks, both intercorporate through local grids connected to the server and among millions users via the Internet. Some fast-growing web applications, such as the World Wide Web, use code (HTML) that runs across all platforms instead of being locked to a single hardware architecture.

The widespread use of the Internet has created new channels for cheap distribution and marketing of software. Because of this, the Internet has

expanded the opportunities for rapid market penetration with the use of bundled software, which enhances the economic importance of protecting these types of intellectual property. The Internet is also a key contributor to the growing number of patents on business methods, many of which relates to tools or procedures used by online stores of goods and services. Although these business practices are often incorporated in software they are not sold directly to end users. Instead, they can support the delivery of online services or products to end users. The Internet has also given a new impetus to the distribution and rapid development of many different types of open source software. Although the so-called "shareware" has always been an important form of software, the ability of the Internet to support rapid, low-cost distribution of new software and, above all, centralized collection and incorporation of improvements from users into this software, has made available such widely used operating systems as Linux and Apache. Thus, the Internet has increased profits for inventors of patented software while facilitating the growth of open source software [21].

The detailed description of this stage goes beyond the analysis of the historical aspects of computer program protection, so let us briefly mention only the most important points.

In 1998, in the *State Street Bank v. Signature Financial Group* case, the U.S. Court of Appeals awarded that numerical calculations yielding a "useful, concrete, and tangible result" is patent eligible. [24]. This award was interpreted by the Patent Office as a requirement to issue patents for software in numerous cases.

In the *Bilsky* case, the United States Court of Appeals for the Federal Circuit (CAFC) on the patenting of method claims, particularly business methods. The Federal Circuit court affirmed the rejection of the patent claims involving a method of hedging risks in commodities trading. The court also reiterated the machine-or-transformation test as the (meaning sole) applicable test for patent-eligible subject matter, and stated that the test in

State Street Bank v. Signature Financial Group should no longer be relied upon [25].

The Supreme Court of the United States issued an opinion on appeal (as *Bilski v. Kappos*) that affirmed the judgment of the CAFC, but revised many aspects of the CAFC's decision. In its decision, the Supreme Court rejected the machine-or-transformation test as the sole test of process patent eligibility. The Court judged that *Bilsky's* software, a patent application for a business method, was not patent eligible for being an abstract idea. The Court refused to rule on the failure of all patents on business practices [26].

In the *Mayo Collaborative Services v. Prometheus Laboratories, Inc.* case, the Supreme Court made the decision that undelay the method for determining patent rights, which has been dominant in software cases. Its essence was to consider the basic principle, idea or algorithm on which the patent application is based, as if it were part of the previous level method, and to create conditions so that the patent eligibility depends on whether the implementation is of inventive nature [27].

In the recent *Alice Corp. v. CLS Bank International* case, the issue was whether certain claims about a computer-implemented, electronic escrow service for facilitating financial transactions covered abstract ideas ineligible for patent protection. The *Alice Corp.* patents were held to be invalid because the claims were drawn to an abstract idea, and implementing those claims on a computer was not enough to transform that idea into patent eligible subject matter [28].

In European countries, the computer programs are mostly protected by copyright, and the requirements for patenting are much stricter than in the United States. The desire to harmonize the European legislation has resulted in the adoption of EU Council Directive 91/250 of 14.05.1991 on the legal protection of computer programs under copyright (it has been in force since 23.04.2009 under 2009/24 / EC). This Directive not only explicitly refers computer programs to objects of copyright law, but also establishes the minimum list

of requirements for the protection of programs, which have been subsequently introduced into the national legislation of the EU Member States.

The result is a rather controversial situation where the applicable legislation excludes computer programs from the patent eligible inventions, whereas the European Patent Office and the courts confirm the patent eligibility of such inventions.

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of 1994 applies copyright protection to computer programs. Clause 10, paragraph 1 of the TRIPS Agreement states, "Computer programs, whether in source or object code, shall be protected as literary works under the Berne Convention" [29].

The WIPO Copyright Treaty (WCT) is a result of the development of the Berne Convention for the Protection of Literary and Artistic Works and is made to further improve the system of international legal protection of copyright through the development of information and communication technologies, including the global computerization of society. Under this Treaty, any contracting party (even if it is not a party to the Berne Convention) shall comply with the provisions governing the substantive rules of law of the Paris Act of the Berne Convention.

The objects of protection in the WCT are as follows:

- ✦ computer programs, whatever the mode or form of their expression;
- ✦ compilations of data or other material ("databases") in any form, which by reason of the selection or arrangement of their contents constitute intellectual creations, are protected as such. This protection does not extend to the data or the material itself and is without prejudice to any copyright subsisting in the data or material contained in the compilation [30].

Thus, as a result of the detailed historical analysis of the development of legal protection of computer programs by the copyright and patent law, the main stages have been identified and described as follows:

Stage 1 (late 1950s – mid 1960s): protection of CP, mainly, by means of the contract law and commercial secrecy law, appearance of cases of CP protection by the copyright and patent law, obtainment of the first patent for CP;

Stage 2 (mid 1960s – mid 1970s): protection of CP by means of the copyright and patent law, intensification of competition between the legal methods of CP protection;

Stage 3 (until the end of the 1970s): protection of CP, mainly, by copyright, appearance of court decisions regarding the patent protection of CP;

Stage 4 (1980s – mid 1990s): combined protection of CP by copyright and court decisions on patent and protection of CP;

Stage 5 (mid-1990s to the present): protection of CP in Europe, mainly, by copyright, and protection of CP in the USA, mainly, by patent; a new wave of intensification of competition between the legal means of protecting CP and searching for compromise solutions.

The analysis of literature on the intellectual property and computer science, the international and national law of different countries, and the case law has enabled highlighting the most important historical events and outstanding inventions, which caused the greatest impact not only on computer technologies, practical solution of the problem of legal protection of computer programs as intellectual property objects, but also on the further development of the computer law.

It has been established that the dominant position of copyright protection of computer programs does not always correlate with the rights and interests of their developers who have been increasingly advocating the implementation of alternative patent protection by special legislation rather than by judicial precedents.

As a compromise solution to the problem of competition in the sphere of legal protection of computer programs by the copyright and patent law, it is possible to introduce a hybrid method of copyright and patent legal protection, which combining the advantages of both approaches, would define, firstly, unambiguous conditions of compu-

ter program patent eligibility; secondly, the possibility of choosing a method of computer program protection by its developer, and thirdly, specific aspects of the expert procedure for optional patenting of computer program based on preliminary presumption of authorship.

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СТАНОВЛЕННЯ ПРАВОВОЇ ОХОРОНИ КОМП'ЮТЕРНИХ ПРОГРАМ НОРМАМИ АВТОРСЬКОГО І ПАТЕНТНОГО ПРАВА

Вступ. Комп'ютерні програми (КП) — один із найновіших об'єктів інтелектуальної власності. З часу появи їх правова охорона викликала багато складностей і суперечок. Ні норми авторського чи патентного права, — ні намагання розробити окреме законодавство не дозволили створити правовий механізм, який би не викликав суттєвих нарікань у зацікавлених сторін.

Проблематика. Аналіз історичних чинників, які зумовили причини вибору різних підходів до правової охорони комп'ютерних програм, дозволяє краще розуміти наявну в кожній країні систему, обирати найбільш доцільні способи набуття прав і охорони цих об'єктів інтелектуальної власності, відстоювати свої майнові та немайнові права, більш обґрунтовано шукати нові шляхи вирішення проблем в цій галузі.

Мета. Дослідити світову історію становлення та розвитку правової охорони комп'ютерних програм нормами авторського і патентного права.

Матеріали і методи. Критичний огляд літературних джерел з питань інтелектуальної власності та комп'ютерних наук, порівняльний аналіз міжнародного та національного законодавства різних країн, дослідження судової практики, яка мала найбільший вплив на практичне вирішення зазначеної проблеми.

Результати. Виділено та охарактеризовано основні етапи в історії розвитку та становлення правової охорони КП нормами авторського і патентного права. Проаналізовано матеріали з питань інтелектуальної власності та комп'ютерних наук, міжнародне та національне законодавство різних країн, судову практику, виділено найважливіші історичні події та видатні винаходи в цій галузі. Встановлено, що домінуюче положення авторсько-правової охорони КП не завжди корелює з правами та інтересами їх авторів-розробників, які все частіше виступають за впровадження альтернативної, патентно-правової охорони КП не судовими прецедентами, а спеціальним законодавством.

Висновки. Як компромісне рішення проблеми конкуренції правової охорони КП нормами авторського і патентного права запропоновано впровадити змішаний авторсько-патентний спосіб правової охорони КП, який би поєднав переваги обох способів.

Ключові слова: правова охорона комп'ютерних програм, авторське право, патентне право.

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СТАНОВЛЕНИЕ ПРАВОВОЙ ОХРАНЫ КОМПЬЮТЕРНЫХ ПРОГРАММ НОРМАМИ АВТОРСКОГО И ПАТЕНТНОГО ПРАВА

Введение. Компьютерные программы (КП) являются одним из самых новых объектов интеллектуальной собственности. С момента появления их правовая охрана вызывала много трудностей и споров. Ни нормы авторского или патентного права, ни попытки разработать отдельное законодательство не позволили создать правовой механизм, который бы не вызывал значительный нареканий у заинтересованных сторон.

Проблематика. Критический анализ исторических факторов, которые обусловили причины выбора различных подходов к правовой охране компьютерных программ, позволяет лучше понять существующую в каждой стране систему, выбирать наиболее целесообразные способы приобретения прав и охраны этих объектов интеллектуальной собственности, отстаивать свои имущественные и неимущественные права, более обоснованно искать новые пути решения проблем в этой области.

Цель. Исследовать мировую историю становления и развития правовой охраны компьютерных программ нормами авторского и патентного права.

Материалы и методы. Критический обзор литературных источников по вопросам интеллектуальной собственности и компьютерных наук, сравнительный анализ международного и национального законодательства различных стран, исследование судебной практики, которая оказала наибольшее влияние на практическое решение этой проблемы.

Результаты. Выделены и охарактеризованы основные этапы в истории развития и становления правовой охраны КП нормами авторского и патентного права. Проанализированы материалы по вопросам интеллектуальной собственности и компьютерным наукам, международное и национальное законодательство разных стран, судебная практика, выделены самые важные исторические события и выдающиеся изобретения в этой сфере. Установлено, что доминирующее положение авторско-правовой охраны КП не всегда коррелирует с правами и интересами их авторов-разработчиков, которые все чаще выступают за внедрение альтернативной патентно-правовой охраны КП не судебными прецедентами, а специальным законодательством.

Выводы. В качестве компромиссного решения проблемы конкуренции правовой охраны КП нормами авторского и патентного права предложено внедрить смешанный авторско-патентный способ правовой охраны КП, который бы соединял преимущества обоих способов.

Ключевые слова: правовая охрана компьютерных программ, авторское право, патентное право.