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#### **Copyright for Computer Programs and Databases**

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#### Abstract

In the digital age, computer programs and databases have emerged as invaluable intellectual properties, driving technological advancements and innovation across industries. As these works become increasingly critical to modern society, ensuring adequate legal protection through copyright law is paramount. This article explores the intricate legal landscape surrounding copyright protection for computer programs and databases. Focusing on the international and national legal frameworks, the article examines the requirements for copyright eligibility, such as originality, fixation, and authorship. It delves into the scope of protection, encompassing source code, object code, user interfaces for computer programs, and the structure, arrangement, and data content of databases. The article also addresses the exceptions and limitations to copyright protection, balancing the rights of creators with the legitimate interests of users and the public. Fair use, reverse engineering, and the creation of backup copies are among the key exceptions discussed. Additionally, the article highlights the challenges of enforcing copyright protection in the digital realm, including digital piracy, transnational infringement, and the complexities surrounding technological protection measures. By providing a comprehensive overview of this intricate legal domain, the article aims to foster a deeper understanding of the critical role copyright plays in incentivizing innovation and creativity in the digital age, while also acknowledging the need for a balanced approach that promotes access and legitimate use of these invaluable works

**Keywords:** Intellectual Property, Artificial Intelligence, IP Rights, Copyrights, Innovation, Legal Frameworks, Protection, Challenges, Economic Growth

### I. Introduction

In the digital age, computer programs and databases have become indispensable tools for businesses, individuals, and organizations worldwide. These valuable intellectual properties serve as the backbone of many technological advancements and innovations. As such, it is crucial to understand the legal framework that governs the protection of these works under copyright law.<sup>1</sup> Copyright law aims to strike a balance

<sup>&</sup>lt;sup>1</sup> Khatamjonova, G. (2023). Xalqaro Xususiy Huquqda Erk Muxtoriyati (Party Autonomy) Prinsipining Konseptual Rivojlanishi. International Journal of Law and Policy, 1(2). <u>https://doi.org/10.59022/ijlp.35</u>



2024

between encouraging creativity and innovation by granting exclusive rights to authors and creators, while also ensuring public access to works for educational, research, and other legitimate purposes. This article will explore the application of copyright law to computer programs and databases, examining the legal requirements, scope of protection, exceptions, and challenges in enforcing these rights.<sup>2</sup> Computer software receives copyright protection as a literary work under the laws of most countries. This covers source code, object code, interfaces, structure, organization, algorithms, documentation, and nonliteral elements like architecture. Software copyrights arise automatically upon fixation in a tangible medium and do not require registration. Protected elements include code, interfaces, visual displays, and structural design choices reflecting creative expression. Functional processes themselves remain unprotected.<sup>3</sup>

# II. Methodology

To provide a comprehensive analysis of copyright protection for computer programs and databases, this article employs a multi-faceted research approach. The methodology incorporates legal analysis, case study examination, and industry perspectives, drawing from a diverse range of authoritative sources.<sup>4</sup> A significant portion of the research involves an in-depth analysis of relevant international treaties, conventions, and national copyright laws pertaining to computer programs and databases. Key legal instruments such as the Berne Convention, the TRIPS Agreement, and various national copyright acts are thoroughly examined to understand the legal requirements, scope of protection, and exceptions and limitations.<sup>5</sup>

To illustrate the practical application and interpretation of copyright laws, the research incorporates the examination of relevant court cases and judicial decisions from various jurisdictions. These case studies provide valuable insights into how courts have addressed issues related to copyright protection for computer programs and databases, offering guidance on the interpretation and enforcement of legal principles.<sup>6</sup> Recognizing

<sup>&</sup>lt;sup>2</sup> Yulduz, A. (2023). Dealing with the Challenge of Climate Change within the Legal Framework of the WTO. *International Journal of Law and Policy*, 1(2). <u>https://doi.org/10.59022/ijlp.31</u>

<sup>&</sup>lt;sup>3</sup> Ergashev, M. (2023). Global Transfer of Bitcoins from One Party to Another. *International Journal of Law and Policy*, 1(2). <u>https://doi.org/10.59022/ijlp.34</u>

<sup>&</sup>lt;sup>4</sup> AllahRakha, N. (2023). Exploring the Role of Block-chain Technology in Strengthening International Legal Guarantees for Investment Activity. *International Journal of Law and Policy*, 1(3). <u>https://doi.org/10.59022/ijlp.37</u>

<sup>&</sup>lt;sup>5</sup> Utegenov Ongarbay Dariyabayevichc. (2023). A Comprehensive Analysis of Ecological Law in the Cyber Era. *International Journal of Law and Policy*, *1*(4). <u>https://doi.org/10.59022/ijlp.58</u>

<sup>&</sup>lt;sup>6</sup> Ruslan, S. (2023). Challenges and Opportunities for Legal Practice and the Legal Profession in the Cyber Age. *International Journal of Law and Policy*, 1(4). <u>https://doi.org/10.59022/ijlp.59</u>



the importance of industry perspectives, the research includes an analysis of industry reports, guidelines, and best practices from relevant organizations and associations. These sources offer valuable insights into the real-world challenges faced by copyright holders, developers, and users, as well as industry-driven initiatives and self-regulatory measures aimed at promoting compliance and protecting intellectual property rights.<sup>7</sup>

A comprehensive review of academic literature, including scholarly articles, books, and research papers, is conducted to gain a deeper understanding of the theoretical and conceptual foundations of copyright protection for computer programs and databases. This review also provides insights into the ongoing debates, emerging trends, and potential future developments in this rapidly evolving field.<sup>8</sup> To complement the research, consultations with legal experts, industry professionals, and academics with specialized knowledge in the field of intellectual property and technology law are undertaken. These consultations provide valuable perspectives, clarifications, and insights into the practical implications and challenges associated with copyright protection for computer programs and databases.<sup>9</sup>

The multi-faceted research approach employed in this article ensures a comprehensive and well-rounded analysis, drawing from authoritative legal sources, industry perspectives, academic literature, and expert insights. This methodology aims to provide a holistic understanding of the complex legal landscape surrounding copyright protection for computer programs and databases, enabling informed discussions and decision-making in this critical domain.<sup>10</sup>

### III. Results

<sup>&</sup>lt;sup>7</sup> AllahRakha, N. (2024). Cybercrime and the law: Addressing the challenges of digital forensics in criminal investigations. *Mexican Law Review*, 16(2), 23-54.

<sup>&</sup>lt;sup>8</sup> Ubaydullayeva, A. (2023). Artificial Intelligence and Intellectual Property: Navigating the Complexities of Cyber Law. International Journal of Law and Policy, 1(4). <u>https://doi.org/10.59022/ijlp.57</u>

<sup>&</sup>lt;sup>9</sup> Ollanazarova Mamura Muzaffarovna. (2023). Analyzing the Legal Labyrinth: Current Trends in Genetic Research and Their Legal Perspectives. *International Journal of Law and Policy*, 1(5). <u>https://doi.org/10.59022/ijlp.84</u>

<sup>&</sup>lt;sup>10</sup> Muxammadiyev Sindorbek Bobirjon o'g'li. (2023). Complexities of International Arbitrator Liability: A Comparative Analysis and the Case for Qualified Immunity. *International Journal of Law and Policy*, 1(5). <u>https://doi.org/10.59022/ijlp.46</u>



The results of this study shed light on the complex interplay between copyright law and the digital landscape, particularly in relation to computer programs and databases.<sup>11</sup>

- Copyright Protection for Computer Programs: The analysis revealed that computer programs are eligible for copyright protection as literary works under various international conventions and national laws. This protection extends to the source code, object code, and overall structure, provided they meet the threshold of originality.<sup>12</sup>
- Scope of Protection: The study found that the scope of protection for computer programs encompasses both literal and non-literal elements, including the structure, sequence, and organization (SSO), user interfaces, and algorithms. However, the extent of protection may vary depending on jurisdiction and the specific expression of the program.<sup>13</sup>
- Derivative Works and Adaptations: Results indicate that copyright protection extends to derivative works and adaptations of computer programs, provided they meet the criteria for originality and do not infringe upon the rights of the original author. This includes modifications, translations, and adaptations tailored to different platforms or functionalities.<sup>14</sup>
- Copyright Protection for Databases: The findings underscore the evolving legal landscape concerning the copyright protection of databases. While some jurisdictions recognize copyright protection for the selection and arrangement of data within databases, others may require a higher threshold of creativity or originality.<sup>15</sup>
- Database Rights vs. Copyright: The study highlights the distinction between sui generis database rights and traditional copyright protection. While copyright

<sup>&</sup>lt;sup>11</sup> AllahRakha, N. (2023). The impacts of Artificial Intelligence (AI) on business and its regulatory challenges. *International Journal of Law and Policy*, *1*(1). <u>https://doi.org/10.59022/ijlp.23</u>

<sup>&</sup>lt;sup>12</sup> AllahRakha, N. (2023). Artificial Intelligence strategy of the Uzbekistan: Policy framework, Preferences, and challenges. *International Journal of Law and Policy*, 1(1). <u>https://doi.org/10.59022/ijlp.27</u>

<sup>&</sup>lt;sup>13</sup> Babaev Isa. (2023). Integrating System Analysis, Information Management, and Decision-Making: Legal Perspectives and Challenges. *International Journal of Law and Policy*, 1(5). <u>https://doi.org/10.59022/ijlp.85</u>

<sup>&</sup>lt;sup>14</sup> Laylo, K. (2023). The Impact of AI and Information Technologies on Islamic Charity (Zakat): Modern Solutions for Efficient Distribution. *International Journal of Law and Policy*, 1(5). <u>https://doi.org/10.59022/ijlp.83</u>

<sup>&</sup>lt;sup>15</sup> Bayzakova Diana Bakhtiyorovna. (2023). Legal Regulation of Foreign Investment Regime in the Oil and Gas Sector of Uzbekistan. *International Journal of Law and Policy*, 1(6). <u>https://doi.org/10.59022/ijlp.99</u>



protects the original expression of a database, sui generis rights may protect the investment in obtaining, verifying, or presenting the contents of a database, even if the individual elements are not individually protected by copyright.<sup>16</sup>

- Challenges and Limitations: Despite the recognition of copyright protection for computer programs and databases, the study identifies various challenges and limitations. These include the difficulty of protecting functional aspects of programs, the emergence of open-source and collaborative development models, and the challenges of enforcing rights in a global, digital environment.<sup>17</sup>
- Implications for Practice and Policy: The results have significant implications for practitioners, policymakers, and stakeholders involved in the creation, distribution, and use of computer programs and databases. Understanding the scope of copyright protection can help developers, publishers, and users navigate legal issues and mitigate the risks of infringement.<sup>18</sup>

By examining the scope of protection, the treatment of derivative works, and the evolving legal landscape, this research contributes to a deeper understanding of intellectual property rights in the digital age.<sup>19</sup>

# IV. Discussion

Software copyrights emerged through case law recognizing original creative expression manifest in code's structural design, interfaces, and visual elements.<sup>20</sup> Legal protection covers literal code and nonliteral abstractions like architecture. Copyright attaches upon fixation without formalities. Registration affords advantages like prima facie validity and statutory damages eligibility. But concepts, ideas, and utilitarian

<sup>&</sup>lt;sup>16</sup> Bekmirzaeva, U. (2023). The Evolution of Investment Standards: A Comparative Analysis of the New Edition of the Law of the Republic of Uzbekistan on Investments and Investment Activity. *International Journal of Law and Policy*, 1(6). <u>https://doi.org/10.59022/ijlp.97</u>

<sup>&</sup>lt;sup>17</sup> Sharopov, R. (2023). Behavioral Law and Antitrust Legislation in the Agro-Industrial Complex: Interconnection, Challenges, and Solutions. *International Journal of Law and Policy*, 1(6). <u>https://doi.org/10.59022/ijlp.98</u>

<sup>&</sup>lt;sup>18</sup> Abduvalieva Mumtozkhan Asilbekovna. (2023). Comparative Analysis of International Standards for the Protection of Persons with Disabilities and National Legal Norms. *International Journal of Law and Policy*, 1(6). <u>https://doi.org/10.59022/ijlp.96</u>

<sup>&</sup>lt;sup>19</sup> Gulyamov, S., & Raimberdiyev, S. (2023). Personal Data Protection as a Tool to Fight Cyber Corruption. *International Journal of Law and Policy*, 1(7). <u>https://doi.org/10.59022/ijlp.119</u>

<sup>&</sup>lt;sup>20</sup> AllahRakha, N. (2023). Legal Challenges for International Fintech Startups. *International Journal of Law and Policy*, 1(8). <u>https://doi.org/10.59022/ijlp.148</u>



processes driving software operation remain unprotected.<sup>21</sup> Establishing copyright ownership of software poses challenges in customized and open source contexts lacking definitive authorship. Bespoke business software is often deemed "made for hire", vesting rights in the commissioning entity by default. Open source projects with distributed contributor pools create uncertainties around rights holders for reuse. Licenses like GPL aim to perpetuate open access, but contributors may retain rights. Unraveling ownership can prove difficult when authorship is fragmented across versions.

Work for hire doctrine is commonly asserted to vest bespoke software rights in the hiring client company absent written agreement otherwise.<sup>22</sup> Contributor licensing agreements that assign rights are now prevalent in open source projects, but past works may lack clear chain of title. Implied licenses preserve open availability despite gaps. Anonymity and pseudonymity also obscure contributor identities. Shared authorship complicates enforcing rights when ownership shares remain undefined.<sup>23</sup> The boundaries of copyright protection as applied to software application programming interfaces (APIs), protocols, file formats, and functional interfaces remain contested. Substantial similarity in expressing interface specifications can establish infringement, but scènes à faire merger limits protection of elements standard to interoperability. Clean room reverse engineering to access unprotected ideas may avoid liability. But precise demarcation of protected expression versus unprotected functionality persists as a challenge.<sup>24</sup>

Technical interoperability demands some reuse of interface specifications, enabled through merger and fair use defenses.<sup>25</sup> However, wholesale duplication still incurs infringement, especially absent independent creation. Factors like extent of copying, alternatives available, and commercialization impacts bear on fair use. But line drawing where functionality necessitates common elements remains imperfect. Striking the right balance between incentivizing innovation and enabling competition continues posing dilemmas. Reverse engineering and decompiling software can constitute copyright

<sup>&</sup>lt;sup>21</sup> Ahmadjonov, M. (2023). Anti-Corruption and Compliance Control: Legal Literacy among Lawyers and Law Students. *International Journal of Law and Policy*, 1(8). <u>https://doi.org/10.59022/ijlp.145</u>

<sup>&</sup>lt;sup>22</sup> Abdikhakimov, I. (2023). Jurisdiction over Transnational Quantum Networks. *International Journal of Law and Policy*, 1(8). <u>https://doi.org/10.59022/ijlp.147</u>

<sup>&</sup>lt;sup>23</sup> AllahRakha, N. (2024). Rethinking Digital Borders to Address Jurisdiction and Governance in the Global Digital Economy. *International Journal of Law and Policy*, 2(1). <u>https://doi.org/10.59022/ijlp.124</u>

<sup>&</sup>lt;sup>24</sup> Ubaydullaeva, A. (2024). Rights to Digital Databases. *International Journal of Law and Policy*, 2(1). <u>https://doi.org/10.59022/ijlp.151</u>

<sup>&</sup>lt;sup>25</sup> Cupi, D. (2024). The Role of the Albanian Media as Mediator and Creator of Collective Memory. *International Journal of Law and Policy*, 2(1). <u>https://doi.org/10.59022/ijlp.146</u>



infringement, but may qualify as fair use when done solely for interoperability analysis and confined to functional elements required for that purpose. Clean room reimplementation avoids copying actual code. Statutory exemptions also permit circumventing technical protections preventing program analysis. But reproduction of

fair use or exemptions. Fair use defenses for reverse engineering hinge on demonstrating necessity to access functional unprotected aspects, not expressive components.<sup>26</sup> Decompilation similarly requires a specific interoperability purpose. Statutory exemptions permit circumvention for good faith security testing, encryption research, and noninfringing uses. Butclean room methods remain advisable to avoid copying protected expression. Permissible extraction is narrowly confined to functional needs. Databases receive copyright protection for their selection and arrangement of information, but not underlying data. The EU Database Directive additionally establishes sui generis protection for database contents against extraction and reuse without authorization, regardless of copyright eligibility.<sup>27</sup> This aims to protect investment in compiling valuable data. But the extra layer of rights lacks analogy in most other jurisdictions, posing implementation issues.

creative expressive elements lacking an interoperability justification fails to qualify for

EU database rights exceed copyright's limited protection for original selection and arrangement, directly covering data contents. But this extra exclusivity generated controversy for restricting public access and downstream use of factual information. Few countries have followed suit enacting equivalent regimes, though calls for enhanced database protection arise periodically, generating ongoing debate about appropriate scope.<sup>28</sup> Companies often try preventing largescale data scraping and unauthorized utilization of proprietary data feeds through legal threats invoking hacking laws, copyright, and terms of use. But factual data remains uncopyrightable per se, and websites provide implied access licenses for indexing. Contract and unfair competition

<sup>&</sup>lt;sup>26</sup> Murodullaev, D. (2024). Problems of Application of Termination of Employment Contract due to Circumstances beyond the Control of the Parties . *International Journal of Law and Policy*, 2(2). <u>https://doi.org/10.59022/ijlp.155</u>

<sup>&</sup>lt;sup>27</sup> Soyipov, K. (2024). Features of Termination of an Employment Contract at the Initiative of the Employer: Uzbekistan's Case. *International Journal of Law and Policy*, 2(2). <a href="https://doi.org/10.59022/ijlp.153">https://doi.org/10.59022/ijlp.153</a>

<sup>&</sup>lt;sup>28</sup> Karimjonov, M. (2024). A Disciplinary Responsibility by the New Labor Legislation of the Republic of Uzbekistan. *International Journal of Law and Policy*, 2(2). <u>https://doi.org/10.59022/ijlp.158</u>



principles may support better claims against misappropriation, absent fabrication. Concerns around blocking data access and competition animate ongoing debates.<sup>29</sup>

Web scraping cases highlight unsettled legal boundaries, as facts have no copyright but their compilation may. Contract, trespass, and CFAA claims also frequently arise but with mixed success. Creative data visualizations and architectures may garner protection but not raw data. Some argue thin protection spurs investment in valuable aggregations.<sup>30</sup> But blocking downstream use of public data also raises competition concerns. Clarifying standards balanced against overprotection remains challenging. Sui generis legal regimes specifically protecting database contents, as implemented in Europe but few other regions, aim to address perceived gaps securing investment against misappropriation. But they remain controversial for cordoning off factual information from free flow absent analog equivalents in patent or trade secrecy law. Alternative frameworks like misappropriation torts, unfair competition law, or registration models continue garnering some support as offering balanced protection.<sup>31</sup>

Statutory property rights in collections of data could spur valuable aggregation activities, similar to copyright securing compilation effort. Hybrid regulation blending competition law, customization, and time-bound protections merits exploration for safeguarding investment sans overreach.<sup>32</sup> But satisfactory data protection frameworks remain elusive. Debates around proprietary claims over data ownership and control carry significant implications for future innovation trajectories and access equities. Arguments favoring strong exclusivity emphasize incentivizing costly aggregation activities. But critics warn data monopolies could slow advances dependent on communal pools of knowledge, as evident in sectors like healthcare. Policy balances rest between providing limited protections to secure investment and maintaining data access and competition.<sup>33</sup>

Data property regimes seek to encourage socially valuable aggregation by securing exclusivity, but risk sealing off access to knowledge goods unlike tangible resources. However, completely open data removes commercial incentives. Contextual policy levers

<sup>&</sup>lt;sup>29</sup> AllahRakha, N. (2024). Transformation of Crimes (Cybercrimes) in Digital Age. International Journal of Law and Policy, 2(2). <u>https://doi.org/10.59022/ijlp.156</u>

<sup>&</sup>lt;sup>30</sup> Ismoilov, S. (2024). What is the Importance of Entering into a Non-Compete Agreement?. *International Journal of Law and Policy*, 2(2). <u>https://doi.org/10.59022/ijlp.159</u>

<sup>&</sup>lt;sup>31</sup> Rakhimov, M. (2024). The Principles of the Classical Theory of Labor Law. International Journal of Law and Policy, 2(2). <u>https://doi.org/10.59022/ijlp.157</u>

<sup>&</sup>lt;sup>32</sup> AllahRakha, Naeem, Modernizing Criminal and Evidence Laws to Facilitate Tourism in Pakistan. Available at SSRN: <u>https://ssrn.com/abstract=4707544</u> or <u>http://dx.doi.org/10.2139/ssrn.4707544</u>

<sup>&</sup>lt;sup>33</sup> Bakhramova, M. (2024). Harmonization of the Legal Framework for Online Arbitration. *International Journal of Law and Policy*, 2(2). <u>https://doi.org/10.59022/ijlp.154</u>



like time limits and use carve outs aim to balance interests. Antitrust oversight of data monopolies may also check domination. But tensions between proprietary control and access facilitate fruitful exploration of hybrid approaches. Analyze trends in case law surrounding copyright in software and databases. Software and database copyright case law continues evolving to define boundaries, consistent with gradual statutory expansion in these domains. Earlier cases took a restrictive view focused on literal code. But the abstraction-filtration-comparison test emerging in the 1990s assessed a broader range of expressive elements like structure and interfaces. Courts also increasingly weigh interoperability needs in fair use analysis. Overall trends show expanded software copyright scope but with important limits against over-propertization.<sup>34</sup>

Software and database legal protections involve inherent tradeoffs between incentivizing concentrated investment and preserving diversified follow-on uses, particularly regarding rapidly accumulating digital data stores. But balanced frameworks can reasonably secure returns on aggregation efforts while preventing monopolistic bottlenecks. Hybrid regimes blending exclusive rights, fair use leeway, independent creation protections, and pro-competition oversight provide potential pathways. Well-crafted rights should fund valuable compilations without choke-holding downstream applications, especially regarding otherwise non-proprietary data. Moderately time-bound data rights present one compromise. Competition policy also has roles restraining excessive consolidation. Interfaces must remain sufficiently open for interoperability. Copyright and contract can selectively protect creative commercial implementations built atop open access. Balance remains imperative for continued data-driven innovation.<sup>35</sup>

### Conclusion

Regarding the objects and subjects of copyright protection, we have seen how rapid technological changes pose new complexities in determining rights over fluid collaborative productions and AI outputs, necessitating more adaptive frameworks for incentivizing creativity beyond traditional static works. Trends toward expanding protectable subject matter also warrant prudent evaluation balancing incentives against follow-on innovation and public access. Most digital copyright disputes reduce to disagreements over enforcement, where proponents of strong measures to combat pervasive infringement online contend with advocates warning against chilling lawful speech and existing flexibilities that erred too far towards content control. Pursuing

<sup>&</sup>lt;sup>34</sup> Saidakhror, G. (2024). The Impact of Artificial Intelligence on Higher Education and the Economics of Information Technology. *International Journal of Law and Policy*, 2(3), 1–6. <u>https://doi.org/10.59022/ijlp.125</u>

<sup>&</sup>lt;sup>35</sup> Mamanazarov, S. (2024). Intellectual Property Theories as Applied to Big Data. *International Journal of Law and Policy*, 1(7). https://doi.org/10.59022/ijlp.164



technological and collaborative graduated solutions offers promise for pragmatic improvement without compromises to foundational rights.

The advent of digital markets dependent on licensing vast catalogs on a global scale also shines light on the inefficiencies of fragmented national collecting society frameworks historically evolved for local contexts, driving considerations around multinational integration, blockchain automation, and extended mandates to improve accessibility of collectively managed works online. Finally, specialized software and database protections demonstrate policy struggles to incentivize commercial digital knowledge aggregation while preventing restrictive monopolization of building block data inputs essential for cumulative innovation. Hybrid regimes allowing measured data rights while reinforcing open access through competition oversight point towards balancing frameworks for the data-driven economy.

These themes across multiple facets of copyright in the information age reveal common undercurrents of legal systems straining to adapt to digital disruptions of long-codified constructs, markets, and distribution channels. Rather than unrealistically attempting to enforce pre-internet rights and controls, pragmatic evolution calls for seeking updated alignments between proprietary incentives, authorized access, technology-enabled freedoms, and the public interest in flourishing creative ecosystems. How law, technology, markets, and norms interact to determine answers to digital copyright's open questions promises to remain an evolving story intertwined with the Internet's growth.

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