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Copyright Through the Prism of the Law and Economics Movement: A Scientific Approach

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Abstract
This paper discusses aspects of economic analysis of law developed because of the status quo existing on the Internet and of the evolution of legal theory on copyright. It also explores the massive increase of interest in the law and economics of intellectual property during the first decade of twenty-first century. The paper argues that law and economics discourse on copyright foregrounds policymaking with a focus on copyright's economic ramifications. This paper also examines Coase's theorem and its influence on considerations about copyright regulatory frameworks and potential reform to keep abreast of ongoing technological advancements and their impact on copyright protection in the digital age.

Keywords Copyright · Works · Publishing · Information · Coase theorem · Internet

Copyrighted Works on the Internet

This paper discusses aspects of economic theory developed under the influence of the status quo existing on the Internet and of the evolution of legal theory on copyright. The emergence of the law and economics movement has captured various segments of policymaking, including the discipline of copyright in law [1]. The roots law and economics has emerged as a significant branch in legal theory with the seminal work of Ronald Coase, Nobel Memorial Prize in Economic Sciences (1960) [2].

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The literature indicates a massive growth of interest in the law and economics of intellectual property by the beginning of the twenty-first century [3]. Economics has a direct effect on copyright, and law and economics discourse on copyright has dominated policymaking, with a focus on copyright's economic ramifications. The economic rationale of copyright is considered the principal justification for this in United States (US) legal doctrine. The *Constitution of the United States* authorizes Congress to legislate for the purpose of securing incentives to authors and inventors by stating, "Congress shall have Power … to promote the Progress of Science, and useful Arts, by securing for limited Times to Authors and Inventors, the exclusive Right to their respective Writings and Discoveries" (article VIII). In Europe, where copyright is viewed as protecting a set of natural entitlements of authors, economic arguments about copyright seem to play a less significant role compared with those in US legal doctrine [4].

However, the topic of law and economics regarding copyright appears to have gained increasing significance in discourse during the first decade of twenty-first century, both in Europe and the US [5, 6]. A key reason for this is the rise of the global information economy, which is increasingly susceptible to international agreements and to a growing trend for the harmonization of intellectual property laws. It is argued that the European and US rationales on copyright are coalescing as a result of the rise of economic arguments in European copyright doctrine [7]. The European Commission through most of its directives on copyright has focused on facilitating an internal market and advancing the community's economic goals; thus, legislation produced by the European Commission and the legal discourse based upon it has increased the use of economic arguments in policy debates related to intellectual property at large.

Therefore, this paper focuses on the impact of information technology on the economics of copyright as such discussion is aligned in the associated rationale. It is our understanding that eventually the economics of copyright will press for change in copyright legislation and question the core meanings of traditional copyright notions such as the nature of property in copyright law. It is mainly because of economic theory as it applies to copyright in the information age that we must reconsider the copyright legal edifice, its undeniable need for existence and its questionable smooth co-existence with technological and societal changes in the Internet networking environment. The information age enhances our dependency on information goods, which have become essential for basic business and political functioning.

Owing to our increasing dependency on information goods, the costs implied by the existing copyright system become more severe. Economic theory that considers the status quo and trends on the Internet, and especially the nature of *public goods* that copyrighted works (and all information goods that become available through the Internet) acquire when they become available online, supports ground-breaking reconsideration of copyright law.

Such a theory rests upon the incentive paradigm for copyright, which aims at efficiency in terms of wealth for the copyright holder and is geared towards wealth maximization for both the copyright holder and any subsequent copyright power holders [8]. The incentives paradigm in copyright makes two crucial assertions: first, that information goods are public goods, and thus, without central intervention, the

investment in creative expressions and the resulting cultural and technological progress will be insufficient; second, that furnishing property rights through the legal edifice of copyright is the cheapest and most effective way for society to hold out the incentive for maximization of wealth via the copyright system [9, 10].

Non-excludability and Non-rivalry of Copyrighted Works on the Internet

Non-excludability is one aspect that renders works of intellect that are protected by copyright a public good from an economic point of view. The microeconomics of copyright and intellectual property effectively demonstrate that information—any kind of information, including, of course, the content of copyrighted works—becomes a public good when it is posted online and is characterized by concerns of underproduction and underutilization [11]. The problem of underproduction stems from the non-excludable nature of information goods such as copyrighted works in the online environment. A good is non-excludable when once it is produced online it is impossible to exclude an individual from using that good, even if he or she does not contribute to the cost of producing it [12, 13]. Non-excludability also occurs when the costs to exclude 'free-riders', aka non-payers for the use of copyrighted work available online, are so high that it would be inefficient to exclude them in practice [14–16].

The non-excludable nature of information goods derives from their ingrained characteristics. Information per se has no physical boundaries, and its duplication, copying and distribution over information networks such as the Internet entail minimum costs. The marginal costs of exclusion are often greater than the minimum costs of the unauthorized use of information works as well as of the marginal costs of provision of information works via the Internet. Therefore, in terms of costs it becomes inefficient to spend resources with the aim of excluding non-payers from the use of copyrighted works. A classic example derived from the analogue world is that of a publisher who cannot prevent the same book from being borrowed and read by several people who have not paid a penny to acquire it. It is not worth the publisher paying the costs to prevent people from borrowing the book from each other because of their reluctance to pay for it.

In the absence of impediments on free riding online, the prices of works that become available online in a competitive market could fall to near zero. Thus, the producer of a copyrightable information work who knows that the competitive market price for the aforesaid product could equal the marginal cost to produce it, and thus would not suffice to cover the producer's fixed costs for production, would reasonably opt not to produce it at all [17, 18]. Hence, non-excludability creates the risk that the creator of a work posted online will not have sufficient incentives to engage in creative invention and production [19, 20].

Other scholars argue that it is not under creators' capacity to secure remuneration by those who use their creative works which in turn discourages them from contributing further, intellectually; thus, there is a loss in welfare of the public because creative works for which there is a market will not be produced for fear of their

use without remuneration [21]. To alleviate this risk, the copyright system renders a copyrightable good excludable for a limited time with the aim of fostering production and allowing creators to charge customers licensees for the consumption of a copyrightable good [22, 23].

The fundamental paradox of information goods including copyrighted works in the online environment rests in their double nature: as economic objects they need to generate revenue, implying that free usage through unpaid access, redistribution and derivatives of creative products must be excluded. As creative objects, however, they necessarily build on antecedent works of others and inspire works by others, implying that an unbounded flow of creative works must be enabled and enhanced by law to ensure a continuous creative process in society. Copyrighted works seen as information goods are created with the intent to be published and released onto the highway of Internet markets. However, once they are published, and, more critically, once they are published online, they become part of general knowledge, naturally available for all to use, reproduce and modify, either for a fee or for free. Since society is intensely interested in these creations and assumes that fewer would be produced if investments cannot be recouped, this creates the legal edifice of copyright, granting through it—among other rights—temporary sales rights and privileges to authors. More importantly, exclusivity in the nature of copyright is also assigned to the creators of works in return for the publication of their works.

Traditionally, a way of protecting creative outputs and the most stereotype outputs (e.g., music, films, novels, radio broadcasts, television broadcasts) for, a copyright holder is to prevent access to information through an exclusionary right, namely, copyright, which is an exclusive legal power furnished to the author allowing for the power to exclude others from any use of his or her copyrighted work. By referring to the right to "exclude others" from using works protected as intellectual property, and by casting copyright infringement as "theft" of the copyright holder's "property" that resides in his or her exclusive domain, the language of property rights over copyrighted works available online would seem to imply an exclusive possessory right in intangible bits of information. This right would entitle the right holder to exclude the rest of the world from that work, which is seen as merely an information asset. While it is beyond doubt that a copyrighted work is not simply an aggregation of bits of information—for example, the copyright system in most European member states comprises a set of laws that govern more issues than merely digital information management issues—the digitization of copyrighted works results undeniably in information aggregation, at least in the form of bits. Under this transformation of a work of intellect and creative expression into information (i.e., bits), it remains questionable whether information per se can accurately be thought of as property in the online environment where "information wants to be free".

What is more, "information wants to be free" is a quotation with respect to technology activists invoked against limiting access to information. In accordance with criticism of intellectual property rights, the system of governmental control of exclusivity conflicts with the development of a public domain of information. The quotation presented above is attributed to Stewart Brand who, in the late 1960s, founded the Whole Earth Network and argued that technology could be liberating rather than oppressing [24]. The earliest recorded occurrence of the expression was at the first

Hackers' Conference in 1984. Brand told Steve Wozniak, co-founder of Apple Inc, the following:

On the one hand information wants to be expensive, because it's so valuable. The right information in the right place just changes your life. On the other hand, information wants to be free, because the cost of getting it out is getting lower and lower all the time. So, you have these two fighting against each other [25].

Unlike finite and scarce tangible resources, intangible information contained in copyrighted works such as literary and artistic works when they become available online is non-rival in nature, in the sense that the use of the resource does not deplete it [26, 27]. Scholars argue that non-rivalry could be considered the opposite of congestion. For example, the enjoyment of watching a football game is not diminished by the presence of many other viewers around the world. In other words, the marginal cost of serving an additional user of a creator's work is zero when the work is available online. Consequently, when an author or other right holder charges for access to the work that becomes available in the market, consumption of the good is needlessly rationed. Users who are unwilling to pay the going price are excluded from using the work, although they would have benefited from it at no cost to anyone. Thus, social welfare is not maximized.

In particular, the term non-rivalry characterizes information goods or services as intangibles of which the consumption by one person does not detract from the ability of others to consume. Information goods are non-rivalrous because they cannot be exhausted by consumption. In contrast, tangible goods are consumptible and exhaustible, in the sense that their usage by one person precludes others from using them. Tangible and scarce resources that are traded in a market are put to their highest-valued use by those who have a legal right upon them. For physical resources, in the absence of transaction costs, bargains in the free market will guarantee efficient allocation of them because the user with the highest-valued usage will be able to offer the highest bid for them.

However, this is not the case with information goods that are intangible and non-rivalrous. Information goods do not raise similar allocation problems such as tangible resources in the market [28]. The non-rivalrous nature of information goods means that there seems to be no social cost associated with their usage since no one else is deprived of that usage when one uses an information work. Therefore, there is no need to allocate information work to the most efficient user, that is to say, leverage the copyright legal edifice with the aim of allocating copyrighted works only to those users who pay for said works' usage ([28], 60).

In addition, network externalities could emerge in the case of information goods' usage in the sense that said usage enhances the value of information goods as increasing numbers of people use them. This is evidently happening whenever the value of information goods depends on the rate of exchange and distribution of them in the market; additional users inflict positive externalities on all users of information goods in the market. In other words, when content such as literary, scientific, and cultural works is more widely used and known in the market, its marketing value through almost any activity that is identified in copyright law as a separate power of copyright (e.g., presentation to the public, distribution, creation of derivative works etc.) is enhanced ([28], 62).

So, while there exists the non-rivalrous nature of information goods such as copyrighted works available online, in the sense that the consumption of a copyrighted work through the Internet by one person does not detract from the ability of others to consume the same work, there also exists the non-excludable nature of the same work in the sense that the use of the work can hardly be limited once it is made available through the Internet to society for consumption. For example, the fact that one person is reading Lawrence Lessig's *Code and Other Laws of Cyberspace* does not diminish another person's ability to read the same book and understand its meanings and analysis, nor is any person excluded by this fact from enjoying the insightfulness of that book just because one or many persons, simultaneously or not, are reading it [29]. Thus, information contained in creative works, such as the aforesaid book available in the Internet environment, is, much like the light from a lighthouse, a public good that once it is made publicly available via the Internet, may be consumed by an infinite number of people, namely, society, in non-rival and non-excludable modus of consumption and at almost zero marginal cost for consumption.

Moreover, like the light from the lighthouse, the use of knowledge and information contained in information works by people creates positive externalities. For instance, once information works are created and made available online there is a benefit to society because the widest possible consumption of them results in the maximization of welfare to society and furthers innovation based on the knowledge and information contained in the information good and copyrighted work. The use of information contained in a copyrighted work available online nurtures the human capital that could subsequently contribute to the production of more information goods and copyrighted works.

The non-excludability trait of information either of copyrighted works or not available online justifies central intervention to secure incentives for further investment in producing new works. At the same time, the *non-rivalry* trait of information goods and works online justifies setting limits on copyright in scope and duration to maximize the copyrighted works' usage to the extent possible for the greatest collective welfare. Thus, both these characteristics of information goods, the *non-excludability,* and the *non-rivalry*, shape the public good nature of literary and artistic works, of intellectual property works, generally, or of copyrighted works, more specifically. This requires production incentives in the form of state-granted copyright rights to create the artificial scarcity necessary to provide competitive commercial value to such information goods and, in turn, to enhance their private production.

For without private rights (in the sense of copyright law's provisions) over public goods (in the sense of information goods according to microeconomic theory), producers of creative works understood as public goods when they are available online will lose their incentive both to produce them and to ensure they are available to society if there is no way to recover the investment made in producing them. This lurking loss of interest in their production and the under-availability of goods such as copyrighted works can be overcome by leveraging copyright's legal edifice and through the artificial notion of excludability (scarcity) in copyrighted works [30, 31]. Thus, copyright law seeks, among other things, to strike a balance between the incentive to create and innovate and the diffusion of the results obtained [15, 32].

This contradiction between the incentive to create from the author's point of view and the unobstructed and beneficial use to society from the user's point of view translates in the economic language as a trade-off between dynamic and static efficiency [33]. Here, dynamic efficiency refers to the improvement and renewal of production techniques and goods overtime. It is the result of investment in research and development as well as in design and creation [34]. Additionally, the concept of dynamic efficiency refers to an economy that appropriately balances short-term concerns (static efficiency) with long-term concerns (focusing on encouraging research and development). Through dynamic efficiency, an economy can further improve efficiency over time. Investments in education, research and innovation are important in this process. Dynamic efficiency also refers to the ability to adapt quickly and at low cost to changed economic conditions, and thereby maintain output and productivity performance despite economic 'shocks' [35].

To achieve static efficiency, allocation of resources should maximize surplus. Surplus in the case of copyrighted works consists not only of a creator's or subsequent right holder's profit, measured by the area between the work's price and the marginal cost (i.e. the cost of serving one additional user by making the work available to him or her), but also of a user's gain, measured by the area between the demand curve for the work and the price of the work. Static efficiency refers to a situation in which the consequences of today's decisions regarding a creator's or subsequent right holder's profits are limited to short-term gains without considering the interests of the public for the work. Thus, static efficiency does not consider the social benefit in the decision-making process regarding the creator's or other right holder's profit and short-term concerns.

While solving the problem of underproduction, excludability therefore imposed by copyright law addresses another problem of information goods, also known as the problem of underutilisation, which is caused by the efforts of right holders to cope profitably with the non-rivalry nature of information goods [36, 37]. As noted earlier, an information good is non-rivalrous when its consumption by an individual does not reduce the quantity of the same good available to others. Non-rivalry of information goods implies that the marginal cost of serving them to an additional consumer is zero or close to zero [38, 39].

In economics and finance, marginal cost is the change in total cost that arises when the quantity produced changes by one unit, and that is also the cost of producing one more unit of a good [40, 41]. If the marginal cost is assumed to be zero or close to zero for non-rival information goods such as copyrighted works available on the Internet, then property rights set by copyright law permitting royalties to be charged to additional consumers of information goods—also known as copyrighted works available online—lead to an inevitable deadweight loss (allocative inefficiency) to society [42]. In economics, a deadweight loss (also known as excess burden or allocative inefficiency) is a loss of economic efficiency that can occur when equilibrium for a good or service is not "Pareto optimal". For example, given an initial allocation of goods among a set of individuals, a change to a different allocation that renders at least one individual better off without rendering any other individual worse off is called a Pareto improvement. An allocation is defined as Pareto efficient or Pareto optimal when no further Pareto improvement can be made. Thus,

the deadweight loss exists in situations in which either people who would have more marginal benefits than marginal cost are not buying the product or people who have more marginal cost than marginal benefits are buying the product.

Therefore, should the copyrighted information good, in other words the protected work, be available at a price that is higher than the marginal cost of serving an additional consumer, then only consumers who are willing to pay the price set by right holders are permitted and expected to benefit from the work. If this number of consumers who are permitted to use the copyrighted information good is diminished dramatically because of the difference between the marginal cost of serving an additional consumer and the price set by right holders for the use of copyrighted work, then underutilization of the copyrighted work as well as deadweight loss are the outcomes ([28], 61, 88).

Classic economic analyses of copyright look for a measurable optimal protection point at which the creation and dissemination of new works is not negated by deadweight losses [43–45]. The aim of legislation in copyright should be to achieve, at least approximately, the maximum benefits from creating additional works minus both the losses from limiting access to protected works plus the costs of administering copyright protection [46–48].

Granting creators, the right to exclude others from using their works necessarily limits the diffusion of those works, and so prevents people from benefiting from them. That is to say, it prevents the social welfare that would otherwise be produced through the widespread use of copyrighted works. In economic terms, copyright rights prevent competition in the sale of the particular work covered by the copyright, and therefore allow the intellectual property owner such as the copyright holder to raise the price of that work above the *marginal cost* of reproducing it [49]. Consequently, consumers who are willing either to pay nothing for the consumption of the work or to pay a price that is higher than the marginal cost of serving additional consumers but lower than the royalty cost that is set by right holders of the said copyrighted work will not be permitted to utilize the said copyrighted work; thus, the problem of underutilization crops up.

The underutilization problem, and consequently the deadweight loss, is easier to understand in the light of works for which there are no substitutes in the market. Copyright's monopolistic price-setting operation for a work that becomes available in the market is not particularly rigid in case there are other works available in the (same) market that could substitute for it. In the presence of substitutes, the right holders of works will, most likely, be forced to sell them at a competitive market price; thus, copyright's protection would not make much of a difference regarding price setting. However, for works without any substitute in the market, copyright's monopolistic power will drive monopolistic pricing of the work, too.

The Coase Theorem

The non-rivalrous nature of information goods such as copyrighted works available on the Internet ensures that the excludability provided by copyright does not—and cannot—amount to perfect control over a protected work. The attempt to eliminate

free use of copyrighted material available online is far from achieving the scope of perfect control for works available online and preventing the free-riding of users unwilling to pay the royalty fee for access to and use of the said copyrighted works. Either the said royalty fee is higher than the marginal cost of serving additional consumers or equal to or lower than the royalty cost that is set by the right holders of the said copyrighted work [50–52]. The traditional attempt of intellectual property law to eliminate free riding is groundless and has harmful consequences.

In microeconomic terms, property afforded by copyright when it is available online does not generate negative externalities as does tangible property [53]. In economics, an externality (or transaction spill over) is a cost or benefit, not transmitted through prices, incurred by a party who did not agree to the action causing the cost or benefit. The classic definition of externality is one of any indirect effects that either a production or a consumption activity has on a utility function, a consumption set or a production set. Indirect refers to the effect created by an economic agent other than the one affected, and the effect is not transmitted through prices (non-pecuniary). A benefit in this case is called a positive externality or external benefit, while a cost is called a negative externality or external cost. In these cases, in a competitive market, prices do not reflect the full costs or benefits of producing or consuming a product or service; producers and consumers may either not bear all the costs or not reap all of the benefits of the economic activity, and too much or too little of the good will be produced or consumed in terms of overall costs and benefits to society.

For example, manufacturing that causes air pollution imposes costs on the whole society (negative externality), while fireproofing a home improves the fire safety of neighbours (positive externality). Then, there are no grounds for the rhetoric that exclusive rights (i.e., copyright on information goods such as copyrighted works) for goods available online should be expected to share the same rationale because such rationale is applicable to tangible goods of real property available offline [54–56].

In fact, the application of real property legal theory to intellectual property and copyright involves the internalization not of negative externalities but rather of positive externalities (i.e., benefits to others). If negative externalities such as transaction costs or marginal costs for serving one additional consumer are non-existent—or exist but are close to zero—for copyrighted material available online, then the application of the well-known Coase theorem is illuminating. It demonstrates that the efficient use of intellectual property resources in the Internet environment does not depend on the assignment of intellectual property entitlements in the online environment derived from the application of the rhetoric for tangible goods of real property in consideration of the offline environment [57, 58].

In law and economics, the Coase theorem, attributed to Ronald Coase, describes the economic efficiency of an economic allocation or outcome in the presence of externalities [59]. The theorem states that when trade in an externality is possible and there are no transaction costs, bargaining will lead to an efficient outcome regardless of the initial allocation of property rights. In practice, obstacles to bargaining or poorly defined property rights can prevent Coasian bargaining. The Coase theorem provides an important basis for most modern economic analyses of government regulation, especially in the case of externalities. George Stigler, the 1982

Nobel Laureate in economics, summarized the resolution of the externality problem in the absence of transaction costs in a 1966 economics textbook in terms of private and social cost, and for the first time called it a "theorem" [58]. Since the 1960s, a voluminous body of literature on the Coase theorem and its various interpretations, proofs and criticism has developed and continues to grow.

In the online world, "information wants to be free". In other words, the application of the Coase theorem in the case of copyrighted works in the Internet environment posits that copyright law and its edifices (such as excludability) become meaningful only when there are transaction costs [60–62].

In addition, in the Internet environment the excludability that copyright law entails should be considered the dominant regulatory model only where and to the extent that other non-excludable regulatory schemes cannot achieve the same or even better results by generating more beneficial effects for right holders and society at large at the same time. In economic theory this means that probably the excludability of copyright may persist in the online environment and the Internet era in a sense of a regulatory mandate to users to pay a levy or tax in exchange for the privilege of unrestricted access to works online under certain conditions, such as on condition of non-commercial use of them in privacy.

In his paper 'The Lighthouse in Economics', Coase challenged the conventional economic assumption that lighthouses, being the quintessential public good, could only be provided by the government by taxing the public [63]. Coase asserted that lighthouses may be privately produced and provided should there are state-established and enforced property rights that would allow the lighthouse owner to collect levies from vessels benefiting from the lighthouse at the port. This should occur without the lighthouse owner having to undertake individual negotiations with vessels or switch off the lighthouse when a non-paying ship approaches its range, to achieve the excludability necessary to make the provision of lighthouse services profitable [64].

The point Coase made in 'The Lighthouse in Economics' is important. He demonstrated that state-granted property rights over a given public resource—the lighthouse in Coase's example, or the creative works of authors that become a public good that is non-rivalrous and non-excludable when available online—serve to encourage the private production of a public good ([63], 358). That is, private entities are permitted to recover payment for the use of the resource without necessarily entitling the right holder to control the resource as private property with an exclusionary property right, also currently known as the author's power of excludability in copyright.

Conclusion

This paper discusses various aspects that stem from economic theory, influenced by the status quo pertaining to the Internet environment and legal theory on copyright. Given the massive increase of interest in the law and economics of intellectual property during the first decade of twenty-first century.

In addition, the paper considers the gradually increasing dependency on information goods and the significance of costs implied by the existing copyright regime. Furthermore, economic theory that considers the status quo, and especially the public good nature that copyrighted works acquire when they become available online, provides the basis for a ground-breaking reconsideration of copyright law.

In consideration of Coase's theorem, microeconomic theory in copyright law similarly reasons that the provision of copyrighted works requires laws to establish and enforce property rights to sustain creative productivity by authors [59]. Since information in literary, scientific and artistic works is infinite, authors require state-established and enforced property rights to allow them to prevent non-paying members of the public from using the protected works without paying royalties; moreover, authors require government-established and enforced property rights that provide them with a solid legal background for the provision of protected works to paying members of society only. Copyright legislation establishes the creator's exclusive rights in information goods, such as a creator's works. Thus, copyright legislation propertizes information materials that consist of a work and facilitates the private production of information materials by temporarily limiting public access to works [20, 65].

Public access to copyrighted works, especially those available online, have in recent times become an issue of growing social concern since private incentives to recover financial investments from public uses of literary and artistic works appear to take precedence over the welfare of users at large. What seems to matter more in the resonance of copyright's evolution are the private interests of those right holders who rely on works produced based on the exercise of property rights that are considered a kind of possessory right entailing a general right to exclude society from using these works [66–68]. When the costs for access to copyrighted works, which include transaction costs in the transfer of property rights, become prohibitively high and are subject only to the uncontrolled intention of copyright holders for maximization of their private profits leveraging copyright laws, then static efficiency prevails but with a significant cost, that is, the cost of deterrence for efficient public use of protected works aimed at garnering useful social knowledge and producing social welfare. In that case, the use of copyrighted works to generate new research and produce new knowledge is hampered, and consequently, dynamic efficiency can hardly be achieved.

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