

Protection for proprietary software has implications for innovation and competition in the computer industry.

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Abstract

Software protection has immense importance for software developers and the computer industry. The ability to protect ideas and concepts that hold important value is pivotal for companies when justifying investment into researching new ideas. But how does software protection affect innovation and competition and does current protection effectively address special issues that are unique to the computer industry (Lessig, L 2002)?

Introduction

Of the many different types of protection that currently exist, Copyrights and Patents have the most relevance for protecting software invention. However, they weren't created with software in mind and as a result do not protect software and efficiently promote innovation at the same time. Many examples of the vulnerabilities of these protection systems exist and will be discussed within this paper.

A Brief History of Software Protection

Traditionally, copyrights were the common protection used for computer software. Lack of access to the US Patent Service resulted in software developers relying on copyrights as the main form of protection in the decades predating the 90's. Copyright law only protects things of a tangible medium. It does not prevent others from using that idea to create something similar. For example, one can copyright a piece of code which prevents others from using this same code. It doesn't, however, prevent others from producing something with the same result. Open Office is a case of this. It has functionality that emulates Microsoft Office but the code behind the software is not the same. Unfortunately, because of this, many software companies regarded copyright law as not being sufficient enough to protect their intellectual property. It simply was too vague for application into many ideas or software code. This led to many software developers feeling the need for a different form of software protection.

The popularity of copyright protection during this period was only because software did not at that time satisfy the requirements for patents. However during the 80's and 90's, many patent applicants found that they could gain patent protection by claiming software inventions as hardware devices and other "machines." In 1994, the Alappat case allowed software developers to simply declare their invention as a computer program implemented through the means of a machine. Barriers for patent software protection were beginning to fall until 1998 when software was regarded as a fully patentable property (Cohen, Lemley 2001).

Has Patent Protection Spiralled Out Of Control?

The availability of patents for software developers initiated a rush of patents pending application which resulted in over eighty thousand software patents existing in 2001. This flood of protected

ideas and concepts resulted in much confusion over what developers could and couldn't pursue. Large software entities made lawsuits against each other in an attempt to control fundamental ideas. Whilst other smaller companies were edged from the market because they could not obtain licenses or unknowingly infringed upon protected concepts.

Patent law has now risen to a point that many argue that it isn't an efficient means for software protection. It does give developers complete control over their investment but also is too restrictive on other companies. It makes many projects impossible to attempt because of the possibility of legal action.

Patented ideas can be used by competitors if they can gain a license that allows them access to the idea. When a company wishes to grant another company the right to make use of protected software, the product can be licensed out with certain restrictions attached that protect the investment and interests of the company.

Many cases exist that illustrate the impact of software protection; these cases effectively portray many of the inefficiencies that plague the current forms of protection used within the market. Legal action taken against companies often result in rulings that shape the way the software industry develops. Innovative ideas are often patented when they are created, often not allowing other competitors to build upon and increase the functionality of that idea. Such restriction of ideas also results in fewer entities with great market presence and fewer companies able to independently operate and flourish. Competition and innovation are two concepts that affect each other and as a result of less competition, innovation may stagnate and result in fewer new ground-breaking technologies.

Lotus vs. Borland

The following case illustrates the shortcomings that arise from using copyright to protect proprietary software. Copyright law is inherently vague and as a consequence cases such as the following resulted in developers pursuing other, more comprehensive means, of software protection.

Interface in Regard to Copyright

Borland released its Quattro program in 1987. The company's objective was to develop a spreadsheet program that was superior to existing programs, including Lotus 1-2-3. In its Quattro programs, Borland attained visual compatibility with the Lotus product by allowing its users to take advantage of an alternate user interface, the "Lotus Emulation Interface." By activating this, Borland users could see the Lotus menu structure and commands on their screens and could use it as if using Lotus 1-2-3, but with a slightly different looking menu that contained many Borland options not available in Lotus 1-2-3. Basically, Borland allowed users the freedom to choose how they wanted to interact with Borland's spreadsheet programs, either by using the menu commands created by Borland, or by using the commands and menu structure used in Lotus 1-2-3 with some Borland additions. Borland included the Lotus menu structure in its programs to make them compatible with Lotus 1-2-3 so that spreadsheet users who were already familiar with Lotus 1-2-3 would be able to switch to the Borland programs without having to learn new commands or rewrite their Lotus macros which might otherwise use up valuable time and money.

Lotus filed action against Borland and the court found that Borland included in its Quattro program a virtually identical copy of the 1-2-3 menu tree. Although in doing so, Borland did not actually copy any of Lotus's underlying computer code in any way. It only copied the words and style of Lotus's menu structure. The court found Borland guilty of copyright infringement and as a result, Borland was forced to remove the Lotus interface emulation component of its software. The courts had now affirmed that even though the code of two programs might not share a single similarity, the "look and feel" of the end products interface could not share any resemblance.



Immediate Results

This resulted in a major shift in the software industries approach to software creation. Companies could no longer create products with a similar visual interface appearance and this would have a dramatic effect on competition in the software industry. No product could share a similar appearance and the end result would be vast amounts of time being wasted simply on users needing to learn the navigation aspects of every piece of software. With companies being forced to make their user interfaces appear different, customers that bought a particular product would now effectively be locked into continuing to buy that companies products or be forced to re-train all their staff. Customers would have little incentive to try the competitions products (Samuelson 1989).

On the flipside, this sort of decision did have positive effects for innovation in the industry. It pushed the industry to come up with innovative solutions to the interface problem. Software developers had no choice but to try improving and streamlining existing interfaces into something now and easier for users to take advantage of. If an interface was truly well designed users should have no problem learning it and copyright of 'look and feel' would not be an issue. This is the sort of environment where innovation in the industry can really thrive.

Decision Reversal

A copyrightable piece of software should by definition have its core workings, the actual code, protected. However the interface does not necessarily fall under that category because it's possible to use different code to convey the same visual appearance. Basically interface has more in common with creative expression than something set in a tangible medium and as such should not be covered by copyright law (Burk 2001). This concept was eventually recognised by many and four years later the courts decision was reversed in favour of Borland. It now found that it was acceptable to have a similar 'look and feel' if none of the underlying code shared any similarities.

The New Effects

Now users could rely on the vast majority of software using the same familiar interfaces they were used to. It let inexperienced users jump straight into a program they had never used, but soon be accessing every feature with ease due to the familiarity of the interface. This allowed users greater confidence in being able to switch between competing products without fear of having to learn two vastly different interfaces. In this way competition between software manufacturers could progress due to users having the confidence to switch to a competing product at any time without having to be re-trained or worrying about compatibility issues. Software developers could easily create superior products that directly competed with others and be assured that users could easily switch. This opened up a wider user base and allowed many developers to expand their range and ultimately increase competitiveness in the industry.

However this reversed decision resulted in some positives and negatives in regard to innovation. The ability to copy an interface does result in the tendency to be lazy in terms of innovation. The same old interface structure gets recycled and very few improvements are made which certainly has some negative impacts in regards to interface progression. Alternatively the ability and perhaps somewhat mandatory choice to make use of an interface structure has also had some positive effects with regards to innovation. With all software being able to appear similar, the focus of customers now fell on product features. Software developers had to start adding more functionality and innovative features to their products in order to make them stand out from the many competing products and as a result had some positive effects in regards to innovation.

In summary, the case of Borland vs. Lotus proved that protections for propriety software can have some mixed effects in regards to competition and innovation in the software industry. With the initial ruling in favour of Lotus, the industry was severely limited in the ways its product interfaces could be implemented and this had a negative impact on competitiveness due to no developer

being able to offer easy to use alternatives. Innovation however was spurned due to forcing developers to come up with better ways to present an interface. Once the ruling was reversed however competition flourished with more companies able to directly compete with each other. Innovation proved to be a mixed bag with both possible decreases and increases in interface and functionality innovations respectively.

Game Copying Software May Ruin Protection for Proprietary Software

The process of game copying is becoming easier, with the release of 321 Studios' Games X Copy. The program is claimed to be for backing up games only, to ensure game-buyers won't lose any game 'for good', should they be damaged or lost.

Profits and Piracy

Sales started at \$60, and profits were doing very well. Not everyone was excited or pleased with the program, however, as movie studios and numerous software developers placed lawsuits against 321 Studios, arguing that the application aids piracy.

321 Studios' president Robert Moore pointed out that, "There is already a long-standing copyright law that gives people the right to make back up copies of their software for archival purposes," and also says that Games X Copy was only intended for the "backing-up" of PC games. He suggests the DVD piracy hails from people intercepting movies and uploading them to the internet, denying that his program was intended for CD piracy.

Breaking Laws by the Law

But 321's program is capable of slipping past copy protection, as it allows the user to perfectly duplicate the image of a PC game. This capability, though useful for making back-up copies of CDs that one normally couldn't back-up, means there is a possibility of this proprietary software being used to make illegal copies of other proprietary software.

The program has a certain law on its side, and may decrease financial gains for the creators of DVD movies and other normally protected software. Yet Hollywood still maintains that 321 are breaking the law, through disregard of the Digital Millennium Copyright Act, which "prohibits the distribution of software or devices intended to circumvent copyright protections."

As Games X Copy has a law to support its case, despite speculation that it is only for illegal purposes, it may negate certain protection schemes by software programmers. Protection for proprietary software is in danger, not through patents, but through the misuse of apparently legal software.

Sun vs. Microsoft

The Sun Java vs. Microsoft debacle started off when Microsoft decided to deliver an incompatible version of Java. Microsoft took advantage of their Java license and created their own Java Virtual Machine (the Microsoft Java Virtual Machine) that implemented what they called 'improvements' to Java. On October 7, 1997, Sun Microsystems Inc. sued Microsoft Corp in the US District Court for neglecting its obligation to deliver a product that was compatible with Sun's Java technology. Sun claimed that it was anti-competitive behaviour and that it would fragment the Java standard. It was to no one's advantage, except Microsoft's, to include a version of Java in every copy of Windows that would be incompatible with all the other Java Virtual Machines that were available (Sun Developer Network n.d.).

Licensing's Effect on Competitiveness

The effects of Microsoft changing the JVM was that programmers who unwittingly coded using Microsoft's Java software development kit would create programs and code that would only



work using Microsoft products. The effect on competitiveness within the software industry as a result of Microsoft's actions is significant. By unwittingly coding Java creations using Microsoft's version of Java, users of other browsers or operating systems would be unable to make use of these creations. In Microsoft's view, a language that would easily convert any program to another computer is a big threat to its continued dominance. So Microsoft set out to create the incompatible Java standard (Newman 2001). This is unusual compared to other case studies, in that it was the lack of protection for Sun's propriety software that has caused this anti competitive behaviour. In most cases it is the presence of protection that normally inhibits competitiveness due to other developers not being able to make anything that directly competes. This also had the effect of reducing cross platform compatibility which in itself also hurt competitiveness. Developers found themselves unable to port their programs over to a platform other than Windows, which resulted in considerable lack of competition on rival platforms and also the inability for Java programs from other platforms to compete with those running on Windows (Drahous, Braithwaite 2002).

Innovation

The effects on innovation as a result of this conflict are also significant. In order to reach Microsoft users, developers are forced to use a limited and outdated version of Java to create programs. If developers cannot make use of security fixes, or program updates, then innovation is sure to suffer as a result. However it could be said that in some cases innovation might have prospered to a degree under these conditions. The lack of cross platform compatibility may have led to having to come up with some unique solutions to fill the needs of other platforms. The introduced difficulty in the porting of products would have forced some developers to create new products specifically for some platforms and as a result, create something specifically tuned to the target platform.

This move, however, did stifle innovation in the hardware industry. In 1995 Intel was in the process of developing a Windows compatible computer chip that would make the original Java standards run extremely fast and efficiently. Because of the incompatible version implemented by Microsoft the production of this hardware was no longer practical. As a result of this, innovation in the hardware industry was also set back.

AOL's Monopoly of Instant Messaging

Instant messaging has been one of the most widely used applications used on the internet in recent years. The ability to send and receive messages in real-time is a very attractive service for many internet users. Thus, this widespread appeal for real-time messaging has resulted in a new and powerful alternative to 'slower' internet forums and email systems. As a result of this, many large companies have wanted to profit from such technology. ICQ, who developed the first official instant messenger service applied for a patent in 1997. This patent, if accepted would have proved a very valuable commodity to any company that controlled it. In 1998, AOL purchased Mirabilis (ICQ's parent company) and gained control of the patent when it was granted in 2002. At this time AOL instant messenger was the most widely used messenger service available but was closely followed by Microsoft and Yahoo who had similar products and increasing market share.

The Patent

The patent (no. 6,449,344) covers any system of communications involving users at a network of terminals. These users are identified by their unique identification code which also is used to give availability information to other users (i.e. they are able to see when people are online). AOL's patent also covers the idea of 'buddy lists' so one can define users they want to monitor availability for, a service which is maintained through the real time monitoring of defined identification codes (Saunders 2002). During the 5 year period in which it took for the patent to be accepted by the US patent service; many other companies emerged with their own implementations for instant messaging.

Possible Cases of Infringement

Over this considerable period of time there have been many different pieces of software that now possibly infringe upon AOL's patent. Microsoft's MSN Messenger is the most popular with the largest user base and in June 2003 was registering over 100 million active users per month (Microsoft.com). Another popular title is Yahoo messenger which operates over a much smaller user base but still is a major player within the field. Over the business sector there are many other software companies creating 'secure' instant messaging services. Mirador Corporate instant messenger is a business oriented solution which uses a secure communication protocol with SSL encryption. Microsoft also has on offer their own equivalent for the business sector named Live Communications Server 2005.

A Concept with Potential

The instant messaging software domain has rapidly grown over recent years, with industry analysts describing its popularity as even more pronounced than the rise of email during the '90s. Imagine the problem if any one company had protection over email systems. It is argued that AOL's possession of such an important system could have major implications for any possible development in real time communications.

The instant messenger concept has a great potential for implementation over many different areas. With computer technology relentlessly increasing towards a pervasive society, this technology could possibly be implemented into most objects. Such a communications system has many possibilities for mobile implementation. Imagine a mobile phone service which had the ability to stay online similar to a home internet connection. A user could chat in a similar fashion as SMS but without the need to send messages by connecting and disconnecting to a service every time a message is sent.

The interesting feature to this patent is that there has been no legal action taken by AOL against any possible infringing companies. This is not to say that AOL's patent is not suppressing innovation within the computer industry. Just the existence of a patent compels many ideas not to be pursued. Be that a lack of funds for gaining a licence for the idea, or just the trouble in trying to work an idea around an existing patent.

AOL does not have any record for taking legal action against other companies, but with this patent they have the grounds to sue two very powerful identities. Microsoft and Yahoo have quite openly created software based around AOL's patented idea and therefore infringed upon this protection. Although AOL has the grounds to take some form of legal action, they possibly haven't so that they have some form of collateral to cover themselves if they ever knowingly infringe upon Microsoft. This is an example that illustrates how software protection is used not solely for the protection of an idea but also for other motivations. Some sources close to AOL have indicated that this protection could possibly be used as a bargaining strategy, possibly to obtain licensing revenue from Microsoft and other companies instead of filing lawsuits (Saunders, 2002). Basically, the following case portrays just how patents can complicate the improvement in many technologies (not just software) and also many of the shortcomings of the patent system.

Protection and Competition within the 3D Graphics Market.

The following case is an example of the impact that protection has had on the 3D graphics market. Although a predominately hardware field, the patents cited are all implemented through software. These illustrate many of the issues that surround many of the patents that are approved within the computer industry.



The Assault Against Nvidia

During the late 1990s, Nvidia, one of the upcoming major 3D graphic solution developers, was gridlocked within numerous patent infringements. A total of three companies had lawsuits against Nvidia, alleging that they had violated patents on many different areas of 3D technology. Most of which were concepts implemented through both hardware and software.

3dfx interactive, possibly Nvidia's greatest competitor at the time, alleged that Nvidia had infringed on their patent titled 'Texture Compositing Apparatus and Method' which basically referred to 3dfx's single pass multi-texturing technology. This technology which was pioneered for coin operated arcade games in 1996, was developed by 3dfx and implemented into their Glide software environment for later hardware integration.

The lawsuit from 3dfx wasn't the only legal action taken against Nvidia. Silicon Graphics Inc. (SGI) are widely acknowledged as one of the major pioneers for 3D graphics hardware and designed many of the ways that computers manipulate 3D objects and render these to the screen. Patented technologies such as Texture Mapping, 'the process of mapping or attaching textures or images onto the surface of 3D objects' is argued to be one of the fundamentals of 3D implementation onto computer systems. SGI found Nvidia to be in violation of their patent. (Bournellis, C 1998)

Nvidia were also under attack from S3. A total of three patents were alleged to be infringed upon, with two of these being a software implementation of a hardware feature. The patents, 'scalable video windows' (5,402,513) and the hardware and software implementation 'for mixing both graphics and video together' (5,625,379) were, and still are considered to be some of the fundamentals of video software and hardware. It was also observed, that this technology had been employed by more than 40 other companies who were also liable for legal action. (Brown, 1998)

Patent Lawsuit Pay Back

It seemed at the time that Nvidia were under attack from every angle and they argued that other companies were just 'lashing out' because of their rapid increase in market presence. But Nvidia also had lawsuits against companies themselves. Their patent, 'the method and apparatus for accelerating the rendering of images', was so fundamental to the 3D industry that they could have taken action against almost every competitor. They instead focused upon 3dfx who were considered their main rival and pursued legal action for many patent infringements (Wasson, 2000). Soon the market became gridlocked with numerous patent violations by many companies.

It had become evident by this time that 3D graphics developers had patents for the most fundamental concepts within the field. As a result of this, any emerging company would have gained considerable trouble in trying to develop a 3D graphics solution because of the plethora of protected concepts. This only resulted in a loss of competition. Over the following years, many companies have been taken over, exited from the graphics field or simply collapsed which resulted in only a handful of companies with considerable market share. Although there could be many factors for this, the protection service could be to blame. Many of the concepts illustrated above portray the way protection for computer technology can get out of control. It would have been remarkably difficult for a competitive 3D graphics solution to be created without infringing on any of these patents. There also would be great difficulty to obtain licences from any of the major graphics competitors without considerable cash or assets for negotiation. The only other competitive 3D desktop graphics company to emerge in recent years was ATI and although they were not a major player within this field five years ago, they were the leader in basic video technology. They had the assets to fund a development into 3D graphics solutions.

3dfx did not survive the many patent infringements that were taken against them and in 2000 were taken over by Nvidia. The takeover resulted in the majority of 3dfx's core assets being purchased

by Nvidia, including patents, trademarks, branding, inventory and patents pending application (Atomic Feb, 2001). Although this was a great intellectual gain for Nvidia, they didn't purchase 3dfx for their recent market performance. The most evident reason for the purchase was to instead close the many lawsuits against Nvidia that 3dfx had pending. In this case, software/hardware protection only resulted in the demise of many innovative 3D graphics leaders, 3dfx, and S3 are examples of once powerful companies edged out of the scene, in part due to a highly protected market.

Microsoft vs. Eolas Technologies' War of the World Wide Web

Microsoft was fined \$US521 million by the lower court of Illinois, for allegedly breaking Eolas Technologies' patent laws with Microsoft Internet Explorer. The patent held supposedly included the ability to incorporate other software into the web browsers directly through hypertext or other methods, such as "plug-ins". The court had originally ruled that Microsoft's IE did not have such functions until after the patent had been approved.

The Patent

Microsoft's Internet Explorer software has dominated the PC web browser industry for some time now, and the giant of a company alone may plug the flow of new, small computer businesses, with their insurmountable wealth and knowledge. But the patent held by Eolas Technologies and the University of California (UC) could have a far more defeating effect. Should the patent be kept, and Microsoft have the case kept in their favour, other web browsers may have to settle for slower methods, unable to directly view video or listen to audio.

Eolas and the UC made claim to have patented "ways of making other software work seamlessly with web browsers". In accordance with this statement, one might think this included displaying animations on any site, seeing as it would require an appropriate program. This had been a worrying prospect, as millions are used to IE, and would suffer from limitations on the easy, integrated system. It could also hurt other web browsers, who may have used similar systems or had planned to in the future. Some may have relied on Internet Explorer for inspiration, and as a good example - a working, globally used web browser, accepted and commended by many around the world. The market could be affected not only by the implications for innovation in the computer industry, but by the immediate affect for Microsoft.

New Evidence

Yet certain evidence had been ignored. Microsoft had intended to show evidence that would suggest Eolas and the University of California had intentionally withheld information of the patent's origins, as it seems many of the ideas may have come from another web browser, in fact, one designed and developed by a student from the University of California. It would seem that the claims in the patent may be more unfair than just limiting the innovative and creative possibilities of other web browser developers, but to have taken the concepts of one to patent in another's name.

This patent, like that of Amazon's regarding one-click online shopping, can speed up the process, allowing users to see videos on the page, as opposed to having to open the file in QuickTime or another similar application. With Eolas as the only company able to use seamless integration and "[execute] remote code embedded in hypertext pages", no other company could incorporate video or audio into a web page, unless it was to be opened separately in the appropriate window.

Turn of the Tides

This means serious changes to Microsoft's Internet Explorer, and possibly to other web browsers around the world, a national, or even global change for one company. One company who seems to have 'cheated', after Microsoft claimed that "prior art" existed, that Mike Doyle, founder of Eolas, had known about such alleged "prior art" as the student's 1993 web browser, Viola.



The case, on a “re-start”, could be of major influence to the competition in the industry, and a win for Microsoft may, this time at least, be better for the world, and for the prevention of a “sole power”.

The One-Click Online Shopping Patent

The idea of one-click online shopping is a system for purchasing items online simply by clicking an “order” button. On September 12, 1997, Amazon.com, Inc. filed a patent for one-click online shopping, as a “method and system for placing a purchase order via a communications network”.

Domination of the online market

Clearly, with Amazon as the only corporation legally allowed to implement one-click online shopping, an unfair advantage is held over other online shopping sites. The system means that even if a person interested in buying a product places an order (simply by clicking the order button), they can’t quickly change their mind. The thinking behind the concept is if they click, they’re buying. The user as result doesn’t have many instances in which they could change their mind. Little could be done to recall the purchase order.

Yet as it is such a simple, easy, quick and effective method by buying online, it is clearly very advantageous. And should mistakes be made, such as the buyer failing to notice what they were actually clicking to order, Amazon will profit from it.

As an example of the problems that can occur, the UK Amazon Website had troubles and received bad publicity after an error in its computer-automated pricing system.

Unjustly Broad Horizons?

The on-click online shopping system includes:

- “in response to only a single action being performed, sending a request to order the item along with an identifier of a purchaser of the item to a server system;
- Under control of a single-action ordering component of the server system, receiving the request;”

This ‘single-action’ could indicate a great range or actions, rather than just the action of ‘clicking a button’. With this, Amazon would have control over more than just one-click online shopping. Amazon’s ‘single-action’ could include visiting their page. Who’s to say they couldn’t force you to purchase all varieties of random sports objects because you happened to visit a single page concerning baseball bats for sale? If the intended range was this broad, it couldn’t be accepted, even if it was all advertised, and there were warnings of the one-visit shopping policy. If implemented to such an extent, it would restrain the creativity of other companies, and Amazon would be able to freely rule the world of online shopping.

Current Control

Yet Amazon is currently in control, with many similar sites apparently having to pay large sums of money for license to use the one-click system. At this point, Amazon has a very useful patent on their side, one with a definition too broad for the good of competition. Other shopping sites will have to pay Amazon for the rights to implement one-click online shopping, making the easy to use system less accessible, therefore limiting the online shopping options.

Conclusion

In conclusion, we can observe that there are several methods for protecting proprietary software which include copyright, patenting and licensing. Any of these protections can be found to have both positive and negative effects in regards to competition and innovation in the software industry. In the case studies addressed, it was found that copyright proved an ineffective protection for software due to only protecting the underlying dynamics of the software. This reduced protection did however allow competition to flourish by allowing rival companies to produce products that customers could easily switch between due to being able to benefit from interface similarity. Under this model innovation is spurred by competition so the overall effect on the industry is a positive one. Patents on the other hand have a much higher degree of protection behind them and as a result tend to have some negative effects in terms of competition. Once an invention has been patented, rivals have no direct means of competing with that without the possibility of being taken to court with the possible exception of being able to obtain a license. This atmosphere however does tend to encourage innovation by forcing software developers to come up with new and innovative solutions to compete with existing protected ideas. Overall, protection is a pivotal part of the software industry, but too much protection can lead to some negative consequences. Software is essentially quite vague in the context of these sorts of protections, so ultimately, or perhaps ideally, it's worth considering that perhaps software should have its own unique form of protection, free from the inadequacies or overwhelming suffocation of current protection laws.

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