# Effective Anti-Piracy Methods to employ in Software Development

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## Abstract

Software piracy in today's global marketplace is so common that nearly one-third of all installed software is pirated. Losses from piracy create an intense need for software publishers to implement measures to protect their software and intellectual property. Protection methods involve enacting intellectual property laws, reducing consumer's desire to pirate software, and implementing software protection schemes. Companies that successfully implement these methods may reduce piracy of their software products.

## Introduction

There is an enormous, growing market for commercial PC software accounting for nearly $50 billion in global sales in 2004. However, for every two legally purchased software licenses, one license is obtained illegally. Revenue lost to software piracy is estimated at $29 billion [1]. This software piracy problem is growing every year and spreading world-wide. In some countries, pirated software accounts for over 90% of installed software [2].

This piracy problem has introduced increasing demands in today's software development process. Before, software companies' main focus was developing new and intuitive software. Now, they must also spend time, money and resources researching and developing techniques to protect their intellectual property. Because of the increasing amount of attention directed towards piracy prevention, it is important for companies to know what can be done to stop the average user from attempting to pirate software. Software piracy can be reduced by employing effective anti-piracy methods during software development.

## Previous Research

Numerous studies have been conducted in the past few years regarding global software piracy. In 1999, the Software & Information Industry Association (SIIA) published its annual Report on Global Software Piracy [3]. The report estimated revenues lost by software publishers for 80 nations. The statistics excluded revenue lost to governments through income or sales taxes, and revenues lost to educational, entertainment (games) or electronic (Internet) software piracy. The study showed that while the percentage of pirated software decreased yearly during from 1997 to 1999, the gross revenues lost to pirated software increased due to an increasing market [3]. The report concluded that increased consumer education and enforcement can reduce piracy rates, though it will be virtually impossible to eliminate it.

More recently, in July 2004, the Business Software Alliance (BSA) published a paper entitled First Annual BSA and IDC Global Software Piracy Study. The BSA conducted thousands of interviews to sample the legality of software installed on computers. Worldwide, pirated

software accounts for 36% of installed software on computers. Broken down by region, this number varies dramatically. In the US and Canada, this number is the lowest at 23%, while Eastern Europe has the highest percentage at 71%. Other regions such as Western Europe are at 36%, Asia Pacific at 53%, Middle East/Africa at 56% and Latin America at 63%. More than half of the countries surveyed had a piracy rate over 60% [1].

In the study, the difference in piracy rates was attributed to several causes. Consumer's annual income varies from country to country, yet software is often priced at one level, especially if it is only sold electronically (over the Internet). Though there exist worldwide intellectual property laws, several countries do not participate. Cultural attitudes can also play an important factor, as morals can differ from region to region.

The study concluded that these piracy rates have a far reaching impact on the global economy. Lowering piracy by 10% over four years would add more than 1 million jobs into the economy and add $400 billion growth worldwide [1]. Even though the percentage of pirated software in the US and Canada is less than the worldwide average, loses are the greatest due to a larger market, at $7.2 billion dollars. The US loses the most revenues annually to piracy of any country at $6.4 billion dollars [1].

Another recent study has shown that approximately 30% of consumers who electronically acquire software use methods that could be deemed as piracy [7]. As the proliferation of broadband increases, piracy rates will likely increase because it will become easier for the average person to obtain pirated software.

**Effective Anti-Piracy Methods**

Effectively preventing software piracy requires multiple tactics. Software companies must ensure they protect their intellectual property, reduce consumer's desire to pirate their software, and implement software protection methods to stop those who want to steal it.

**Intellectual Protection**

An essential part of employing anti-piracy methods is to ensure that intellectual property (IP) is properly protected. This requires effort from both software companies and national governments. First, governments must ensure that laws exist to protect company's intellectual property. Next, these laws must be enforced against infringers. Finally, the industry must educate the public about the IP laws.

The first step in implementing proper IP protection is to encourage governments to create the laws that will protect IP against infringement. This includes software patents and copyrights. Software companies should know what laws protect their IP in marketable countries, and lobby the governments if these laws are not adequate. Strong intellectual protection laws exist in most developed nations, and many other counties are developing these laws. The United States recently passed the Digital Millennium Copyright Act [4], which includes many provisions for protecting intellectual property. US copyright offenders are fined up to $150,000 per civil infringement or up to $250,000 and five years in jail for criminal infringers. World copyright

protection laws include the World Trade Organization's Trade-Related Aspects of Intellectual Property [5] (TRIPS) and the World Intellectual Property Organization (WIPO) Copyright Treaty [6].

The next step in intellectual property protection is ensuring that there are measures in place to enforce the laws. Without proper enforcement, the laws can do nothing. In the United States, both private companies (Microsoft) and government agencies (Department of Justice, FBI, police departments, postal service) can file criminal suites against alleged offenders [3]. Other national agencies such as Canada's RCMP and government agencies in Hong Kong, Malaysia, and Taiwan have also taken enforcement actions against IP crimes. It is important that there are criminal penalties for IP infringers, or the laws will be broken.

The final step in implementing intellectual properly laws is consumer education. Education is essential for deterring piracy, as many consumers are unaware they are actually breaking laws. Many consumers think it is legal to install software on multiple machines, enter copied registration codes, or download commercial software over the Internet. Recent studies have shown that 54% of consumers are unaware any policies against redistribution of paid-for content exist [7]. Another study found that only 25% of college students take the position that piracy is wrong [8]. Only when consumers understand that infringing is immoral and illegal will they stop pirating software.

**Reducing Consumers' Desire to Pirate the Software**

A powerful method to prevent software piracy is to make it less desirable to pirate in the first place. Software companies can take several steps to do this, including making it easy to legally obtain the software, ensuring proper pricing, and changing social attitudes.

Making software easier to obtain legally is essential in reducing piracy. Consumers that cannot find the software in a legal market will turn to other means to acquire it. It is very important to offer the software though several venues. This may include offering downloadable versions in countries that do not offer the product in retail stores. If consumers can find a way to legally acquire the software from a company, they will be less likely to turn to illegal means to get it.

Pricing is also an important consideration for consumers. If the monetary cost to legally obtain the software is more than the time cost of obtaining it illegally, the consumer will pirate it. Regional income considerations must be used when determining the price at which software will be sold. Piracy rates are often higher in developing countries, where consumers usually make considerably less income [1]. Consumers with less income will be more likely to pirate the software since they cannot afford the high price.

Finally, there are social considerations to take into account when selling software in different countries. Attitudes on the morality of software piracy differs from region to region, due to cultural differences. In areas such as Hong Kong and China where piracy rates are high, social beliefs have long held that copying works of any kind is necessary and honorable, and a way to learn [9]. A combined industry and government educational campaign can help change these attitudes over time.

## Software Protection

The easiest and often most productive way of preventing piracy is implementing mechanisms in the software to stop illegal copying. Common mechanisms include issuing registration codes, requiring product activation, and physical media protection.

## Software Protection: Registration Codes

The most basic form of software protection is the use of registration codes. Registration codes are essentially a unique string or a combination of unique strings that must be entered by the user to run the software. A code is given to each customer when they purchase the software, and these strings are impossible for the user to generate on their own. This is an effective way to allow only legitimate customers run the software. Software companies can either create a pre-generated list of codes for customers to use, or generate a unique code based on the customer's name or computer signature.

Pre-generated codes require less effort for the company, as all they have to do is include a code in each software package sold. Unique strings can be generated by the millions in a small amount of time. However, using pre-generated codes makes it easy for the user to copy the code for use on another machine. This kind of piracy can be reduced by using online activation (see below).

Registration codes can also be generated from a unique computer signature. A computer signature is created by taking unique information about the machine and converting this into a code that can only be used on that machine. This will stop users from entering the code on more than one machine. However, it also requires extra effort for the software company to generate these codes and communicate them to the customer after the purchase. Technical difficulties might also arise from this complicated process.

Unfortunately, it is often easy for software pirates to distribute pre-generated codes on the internet for other consumers to use. Many pirating groups have reverse-engineered code generation algorithms to create their own codes. They create key-generators that will make a code for any user who wants to pirate the software. However, registration codes still provide a simple mechanism to protect against the casual consumer who is not willing to spend a lot of time figuring out how to pirate the software.

## Software Protection: Online Activation

Online software activation is another layer of protection that can be added to software packages. Online activation requires the customer to contact the software company after the purchase to unlock the software package. The software company will only allow this activation if the customer has legally purchased the software, and it has not activated on another computer. This makes it much harder for the customer to illegally install the software on more than one machine.

Online activation requires a greater amount of effort from the company. They must provide the infrastructure for customers to contact them and unlock their software. Sometimes customers

will not have Internet access, so the company must be prepared to activate the software by telephone or other means.

There are methods that software pirates use to bypass online activation. Pirating groups release patches for the software to bypass the activation, or they reverse-engineer the activation algorithms and fake them. Though it provides another layer of protection over registration codes, the software company must devote additional infrastructure, time and costs to this form of protection.

**Software Protection: Media Protection**

The final form of software protection is protecting the physical media. Floppies, CDs and DVDs can normally be copied from one computer to another without any problem. Many customers will try to install a software package on more than one computer from the same CD. With the availability of consumer CD and DVD copiers becoming more common, many users are copying media they have purchased and giving it to friends. In many countries where piracy rates are high, software pirates copy these packages worth hundreds of dollars and sell them cheaply on the street for as little as $2 [2].

There are many companies that offer commercial packages to protect media from being copied. One popular method involves using custom software drivers to deny copying of the media. Other methods introduce random errors into the media so copying doesn't work, and using digital rights management technologies. Some companies offering solutions are Macrovision's Safedisc and Sony DADC's Securom.

Media protection should be employed in most software packages, though the costs to license these third-party solutions must be taken into consideration. Media protection does not stop downloaded software packages from being copied. There also exist tools to bypass many protection methods (including those listed above), such as Daemon Tools and Alcohol 120%.

**Summary**

With computer software becoming a large and growing industry, it is becoming more and more important to protect software companies' products against illegal activities. Software companies in today's marketplaces should be aware of the methods that pirates use to steal software, and common tactics they can use to protect their intellectual property. Though piracy is not likely to stop completely, attacking the problem from several angles will result in increasing sales and revenues. The harder it is for a user to pirate a product, the more likely they will purchase it legally.

## References


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