Ethical Implications Of

Modifying Modern Mobile

Computing Platforms

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Introduction

This paper examines the ethical implications of end-users modifying their mobile computing platforms. The term "mobile computing platform" is used to encompass the combination of hardware and software that constitutes modern devices such as smartphones, personal media players, and mobile internet devices.

While numerous platforms exist in the mobile computing space, this discussion will focus on three specific operating systems:

- Apple iPhone OS

- Palm WebOS

- Google Android OS

The decision to examine these three platforms is justified by their relative current and predicted future market share, extremely public levels of platform modification, and a fair amount of existing technical documentation and media coverage that provides a suitable body of knowledge for scrutiny in a research paper context. Notable omissions from this paper include Microsoft's Windows Mobile OS, Nokia's Symbian OS, and Research in Motion's BlackBerry OS. While these last three platforms are important and relevant entities in the mobile computing marketplace, they do not meet the criteria outlined above.

Overview of Three Modern Mobile Platforms

iPhone OS

Currently in its third major release, the iPhone OS is a UNIX-based

operating system that is primarily derived from Apple's Mac OS X that the

company sells installed on its desktop and laptop computers. Applications for the

device are developed in the Objective-C programming language. Since its launch

in June 2007, the iPhone OS has become available on five hardware devices:

the original iPhone, the iPod Touch, the iPhone 3G, the second-generation iPod

Touch, and most recently the iPhone 3GS. As of June 2009, there are reportedly

40 million devices in circulation worldwide running this platform.[1]

WebOS

Originally announced in January 2009, Palm's WebOS is a Linux-based

operating system. Developers for this platform can create applications using the

common web-development languages of JavaScript and HTML, although a

software development kit is not scheduled for release to the general public until

late summer 2009.[2] Only one device currently commercially available runs the

WebOS: the Palm Pre. Since its release on June 6, 2009, the Palm Pre has

amassed a user base of 300,000 individuals, with between 50,000 and 100,000

of those purchasing the device during its launch weekend. [3] [4]

Android OS

The Android OS began its life as a platform developed by startup company Android Inc. However, in August 2005 the company was purchased by Google to serve as the foundation for its mobile initiatives.[5] Two years later, Google announced that the Android OS would be released under the direction of the Open Handset Alliance. This entity included 47 technology companies ranging from Sprint to Motorola.[6]

At its core, the Android OS is a Linux-based system. Unlike the iPhone OS or WebOS, the Android OS is unique in that it is open source, although there is some disagreement about the validity of this claim since Google has retained ownership of the Android software development kit.[7][8] Applications for the platform are written in JavaScript. Currently a single device in the United States runs the Android OS, the T-Mobile G1, and it only recently surpassed the 1 million units sold mark, despite being available since October 2008. Nevertheless, many Android-based devices are expected to launch during the fall of 2009, and some projections estimate over 6 million Android OS devices will be in use world-wide by the end of the year.[9]

Unlocking vs. Jailbreaking Explained

While Apple's iPhone has garnered the majority of the media attention surrounding unlocking and jailbreaking activities, the general concepts also apply to devices running the WebOS or Android OS. In short, unlocking a device

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enables an individual to use it on a different cellular network than the one on which it was originally intended to operate, whereas jailbreaking a device enables a user to install third-party software on the device without restriction. A more detailed analysis is below.

<u>Unlocking</u>

Any cellular phone or mobile internet device with cellular network connectivity that runs one of these previously mentioned operating systems is truthfully two computers in one. While both physically and conceptually it appears to be a single device, inside there is one computer handling communication with the cellular network and another computer handling most everything else a user can do with the device.

The term "computer" is fairly precise here, since each has its own CPU, memory, and operating system. As an over-simplified example, imagine a walkie-talkie duct taped to a Palm Pilot. The walkie-talkie would be considered the device's baseband system, while the Palm Pilot would be the device's host system. In modern devices, the links between the two computers are admittedly more elegant and functional than duct tape, but when it comes to modifying a device, the baseband and host systems are similarly treated as separate entities. For the purposes of unlocking, a user has to modify the baseband system in the device.[10]

There are two ways to modify the baseband system in a device. The first, and more difficult of the two, is by opening up the device and physically making modifications to the chip containing the baseband system. This was the method employed during the first reported successful unlocking of the original iPhone in August 2007.[11]

The second and more popular method is referred to as a software unlock. This involves either replacing the software contained in the baseband system with a version that does not contain a carrier lock or injecting code into the existing software that effectively disables the carrier lock. In the case of devices running the iPhone OS, these software unlock methods are developed by the iPhone Dev Team, a group of anonymous hackers responsible for both unlock and jailbreak tools. Such tools include Pwnage, QuickPwn, Yellowsn0w, redsn0w, and most recently ultrasn0w.[12]

Jailbreaking

In order to run unofficial or unapproved third-party applications on these mobile computing platforms, a user needs to jailbreak the device by modifying the host system software. Depending on the tool used to accomplish the jailbreak, the process could entail injecting code into the host system software while it remains on the device, or alternatively extracting the host system software to a computer to make the necessary modification and then subsequently reloading the altered host system software back to the device.

Once a device is jailbroken, the user can run non-digitally signed code, a capability that was technically forbidden on stock devices. This allows the installation of numerous third-party applications that independent software developers create. These applications may have advanced capabilities or grant the user administrative access to the device, allowing customization to both the form and function of the system software. For example, after jailbreaking a device, the user may enable the device's camera to record video or change the icons displayed in the user interface. These modifications would be forbidden or otherwise disabled on a non-jailbroken device.[13]

Company Responses

For a company that creates a mobile computing platform, dealing with customers who choose to unlock or jailbreak their devices represents a delicate situation. One perspective is that such activities constitute a threat to the company's intellectual property or even represent copyright violations. Alternatively, such a thriving developer community and interested user base can contribute to increased device sales and ultimately a larger slice of the mobile computing platform market.

Until early 2009, the creators of these three platforms remained largely silent on the topics of unlocking and jailbreaking. However, in February 2009, Apple chose to file a request with the United States Copyright Office to specifically exclude jailbreaking activities from potential exemptions to the Digital

Millennium Copyright Act (DMCA). Such exemptions are considered every three

years, and include activities such as a school teacher presenting a copyrighted

video in the classroom. Without an exemption, that activity would be prohibited

under the language of the DMCA, but since it is exempted, such an activity is

legal.[14]

Apple's request was not without provocation. Earlier in the year, the

Electronic Frontier Foundation filed its own motion to the Copyright Office for

jailbreaking activities to receive such an exemption under the DMCA.[15] The final

decision from the Copyright Office is expected in October 2009.[16]

Google has taken a largely hands-off approach in the context of seeking

action against those users or developers who utilize or enable jailbreaking of the

Android OS platform. While Google has closed publicized exploits in the OS that

enabled jailbreaking in subsequent releases of Android, they have not taken a

public stance decrying those who jailbreak their devices.[17]

Palm appears to be taking a moderate approach somewhere in between

those displayed by Apple and Google. The firmware on Palm's Pre smartphone

can be modified, or "flashed" by simply holding down the volume button when

the device is booting up.[18] Further, a developer mode can be accessed on the

device by typing in a simple code, making a jailbreak trivial.[19] Despite these

seemingly hacker-friendly platform decisions, Palm has also requested that a

webOS software development website not publish instructions on how to enable

data-tethering on the device, which would allow the Pre to be used as a wireless modem for an attached laptop.[20] The implication seems to be that Palm will allow some modifications to their platform by enthusiasts, but try to prevent other such modifications.

Ethical Considerations

Why would a consumer wish to jailbreak or unlock a mobile computing device? The answer to this question is perhaps the most telling as to whether such activity is ethical.

In the case of unlocking, the answer seems to be less complex. Individuals who unlock their device do so in order to use it on the cellular network of their choice. Often this is a necessity since not all cellular phones are available worldwide. For example, the iPhone is not offered for sale in China. If a Chinese consumer wishes to use an iPhone in their native country, the only option is to acquire an iPhone from another country and then unlock the device. That same consumer may be perfectly willing to buy and use a carrier-locked iPhone, but due to exclusive carrier agreements, they do not have that choice.

Similarly, an American consumer may wish to purchase an iPhone, but lives in a rural community where AT&T (currently the exclusive carrier of the device in the United States) service in unavailable. In this scenario, the user only desires to utilize the device on the GSM cellular network available in their

area. Based on this assessment, it would appear unlocking a device in order to use it on another network does not constitute unethical behavior.

This evaluation also has solid legal grounding. In 2006, the United States Copyright Office granted an exemption to the DMCA for cellular phone unlocking, stating, "The underlying activity sought to be performed by the owner of the handset is to allow the handset to do what it was manufactured to do – lawfully connect to any carrier.[21]" However, these exemptions only last three years before the Copyright Office must once again be petitioned for the exemption to be reconsidered. The Electronic Frontier Foundation included a proposal to continue such exemption as part of the 2009 DMCA triennial rulemaking.[10]

The topic of jailbreaking is both ethically and legally murkier. From an ethical perspective, the intent of the user engaged in the jailbreaking activity will determine if the act is ethical. While many users jailbreak their devices to gain additional functionality and install independently developed third-party applications, other users do so in order to download and install pirated commercial software that is legally available from official application distribution channels, such as Apple's iTunes App Store.[22] In the later situation, the piracy enabled by jailbreaking is unethical, although the mere jailbreaking of the device itself does not seem to constitute unethical behavior.

Further complicating the ethical determination of jailbreaking are the matters of customer service and product support. While jailbreaking a device

typically voids its warranty, not all users are aware or mindful of such a risk. If the device malfunctions after being jailbroken, is it ethical for the customer to expect the company to support the modified platform either by repairs or telephone support? The answer is likely "no," although the device's manufacturer may be hesitant to refuse support for fear of negative publicity or customer backlash.

From a legal standpoint, jailbreaking is currently neither explicitly prohibited nor explicitly permitted. This is why both Apple and the Electronic Frontier Foundation have petitioned the Copyright Office for consideration in the 2009 DMCA Rulemaking, albeit arguing opposing viewpoints. The Electronic Frontier Foundation hopes to have jailbreaking given explicit exemption status, effectively making such activity legal.[23]

Conclusion

While the legality of jailbreaking and unlocking will be settled for the next three years as of October 2009, the ethical debate surrounding such activities will likely continue for some time to come. As long as independent developers perceive they can improve upon the software being offered by the companies that make the devices, the jailbreaking community will continue to exist either openly or underground. For their part, the companies will expectedly continue a cat and mouse game with jailbreakers by way of patching exploits with each subsequent release of their operating systems.

This back and forth seems destined to benefit all users of mobile computing devices in the long run. Despite considerable resources and intimate working knowledge of their respective platforms, the companies cannot perfectly gauge demand for all features nor predict all the ways in which their platforms may be utilized. The jailbreaking community serves as a feature innovator, incubator, and testing ground all rolled into one. The best features and functionality will likely be assimilated into or duplicated inside of future official releases of these mobile computing platforms. In the end, the technology evolves both in spite of and because of all those who create.

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