

THE ETHICS OF IOS JAILBREAKS

Trevor Arcieri
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Like many in my generation, I got my first mobile device in elementary school. It was a 4th generation iPod touch that my dad found on Craigslist. In the item description, he saw that the iPod was "jailbroken" but had no clue what that meant or what it could mean for my future. This particular device had an untethered jailbreak, which means the jailbreak persisted through a device reboot.

The process is more complicated than this, as the jailbreak included a modification to the device's boot loader, which would enable root access before booting up the operating system. In other words, a change in the code run when the device turns on would re-hack into the operating system. Each time the device turned on, I would watch in awe as an abundance of green terminal text would scroll across the screen.

Now, as a Computer Science and Computer Engineering dual major with an Electrical Engineering minor at Kettering University in the 3rd year of my studies, and one with a profuse interest in all things computing at that, I look back on those moments watching that green text as the first times I had an interest in the inner-workings of the seemingly-simple technology all around me. Seeing the text, which was too small and scrolling too fast to read any significant amount, I would ask myself, "What's going on in there?" As I will detail shortly, this experience of gaining an interest in computing from an iOS jailbreak is a direct result of the nature of the jailbreak.

To be clear, what is iOS jailbreaking? At its core, it uses a privilege escalation exploit to remove restrictions within iOS, Apple's mobile operating system; the exploit can remove these restrictions because it allows root access to the operating system.¹ An exploit is software that uses an existing vulnerability to cause unintended behavior in a computer system.² Root access, then, is access to the operating system as the administrator, allowing the user to make unrestricted changes to the system.³

Jailbreak exploits, in particular, are privilege escalation exploits that gain elevated access to protected resources in the operating system.⁴ Jailbreak exploits usually work through kernel patches, which are modifications to the kernel. Modifying the kernel creates an extremely powerful exploit since the kernel sits at the core of the operating system and controls everything in the system.⁵

What, then, does jailbreaking do? The main result of jailbreaking an iOS device is access to free software installation. In this case, free software installation does not mean free in the monetary sense because some software installed after a jailbreak can cost money. Instead, it is free software installation in the Richard Stallman of GNU sense: entirely unrestricted.⁶ Primarily, a

¹"IOS Jailbreaking," Wikipedia, December 16, 2023, https://en.wikipedia.org/wiki/IOS_jailbreaking.

²"Exploit," TREND MICRO, 2023, <https://www.trendmicro.com/vinfo/us/security/definition/exploit>.

³"Superuser," Wikipedia, December 15, 2023, <https://en.wikipedia.org/wiki/Superuser>.

⁴"Privilege Escalation," Wikipedia, November 17, 2023, https://en.wikipedia.org/wiki/Privilege_escalation.

⁵"Kernel Definition," The Linux Information Project, May 31, 2005, <https://www.linfo.org/kernel.html>.

⁶"IOS Jailbreaking."

jailbreak allows the installation of apps without restrictions from App Store guidelines.⁷ Since a device with root access installs these apps, the apps can manipulate restricted areas of the operating system, such as the user interface.⁸

The perks of jailbreaking, though, do not come without risks—the main trouble lies in the definition of a jailbreak: gaining root access to iOS. Gaining root access to any operating system is extremely dangerous, and even many standard Linux programs explicitly warn against running with root access. As previously noted, root access allows user programs to manipulate the entire OS as a superuser, enabling access to all files and programs on the device. Some of these files and programs are restricted from user access out of necessity by Apple developers since modification could damage the device.

Thus, jailbreaking is dangerous because the installed jailbreak software has access to the entire operating system, allowing the unregulated jailbreak software to perform any action within the system. Further, jailbreaking is exponentially more dangerous due to the unrestricted software installation that comes along with a jailbreak, as any of the unregulated programs installed onto the device also have root access to the operating system.

Jailbreaking was popular in the mass media, especially in its early era, so many parties have cultivated an opinion on the topic. Apple, for one, is staunchly opposed to jailbreaking, at least publicly. In the iPhone user guide section covering unauthorized modification of iOS, Apple expresses this opposition. They claim that jailbreaking is harmful because it eliminates security layers within the operating system; can cause increased battery drain and system crashes; can disrupt services like iCloud, iMessage, and FaceTime; can preclude the device from software updates since an update could make a device permanently inoperable (colloquially known as "bricking" the machine); can cause irreversible damage to iOS; and violates the iOS software license agreement and thus the Apple End User License Agreement (EULA).⁹

On the other hand, jailbreak users, and thus some of Apple's users, vehemently favor jailbreaking. The unrestricted software packages enabled for installation following a jailbreak are commonly called "tweaks." They are managed by some package-management software, with the most common package manager being Cydia; the package manager serves as a sort of "app store" for tweaks.¹⁰

⁷"Agreements and Guidelines for Apple Developers," Apple Developer, 2023, <https://developer.apple.com/support/terms/>; Associated Press, "Jailbreak! New Rules Allow Unapproved Iphone Apps," Fox News, October 22, 2015, <https://www.foxnews.com/tech/jailbreak-new-rules-allow-unapproved-iphone-apps>; Chris Forseman, "iPhone Jailbreaker Set to Bring Cydia to Mac OS X," Ars Technica, December 14, 2010, <https://arstechnica.com/gadgets/2010/12/iphone-jailbreaker-set-to-bring-cydia-to-mac-os-x/>.

⁸"iOS Jailbreaking."

⁹"Unauthorized Modification of iOS," Apple Support, 2023, <https://support.apple.com/guide/iphone/unauthorized-modification-of-ios-iph9385bb26a/ios>.

¹⁰Adam Dachis, "How to Get the Most out of Your Jailbroken iOS Device," Lifehacker, March 14, 2011, <https://web.archive.org/web/20151225202409/http://lifehacker.com/5781437/how-to-get->

Some tweaks serve as alternative or better versions of apps in the App Store; others allow configuration of the operating system in many ways, namely in specific and beneficial user interface features.¹¹ Both forms of tweaks are desirable to the user. Further, Apple censors certain apps in the App Store,¹² which frustrates many of its users.¹³ On Cydia, there is no censorship of tweaks. Furthermore, over 60 of the most memorable features implemented on iOS since its 5.0 release were features that the jailbreaking community first released on Cydia: features we use every day, from the more noticeable like emoji support, dark mode, predictive text, and control center, to the less prominent like interactive notifications, a button to clear all notifications at once, and the one-handed keyboard.¹⁴ With the jailbreaking community first developing all these features, it follows that users would enjoy access to the new and advanced features that jailbreaking permits.

With strong opinions on each side, it is essential to ask: Is it ethical to jailbreak your iOS device? To answer this question, it is first necessary to consider the rights and obligations of each party involved. The rights and obligations of Apple regarding jailbreaking must be considered.

First, Apple owns its proprietary iOS operating system and can restrict its usage via the iOS software license agreement. Thus, Apple has the right to limit the functionality of iOS. Similarly, since Apple is selling products containing their licensed software, Apple has the right to enforce that license regarding the use of the software on their devices. In terms of obligations, Apple's primary goal and duty as a corporation is to turn a profit for its shareholders. This obligation to turn a profit leads to other commitments as well. To keep their users (and thus their profit), though, Apple is obligated to some extent to provide innovative features and customization within their software. Finally, to maintain its public reputation (and its profit), Apple must produce safe software for its users.

All Apple users' rights and obligations regarding jailbreaking must be considered. Importantly, this party includes all of Apple's users, only a subset of which, jailbreak users, actually jailbreak their devices. First, every Apple user has the right to customize their device to an extent: the user owns the physical device, and it is only human nature to customize that which one holds. Additionally, since each user is paying a premium for an Apple device, it is reasonable to conclude that the user has the right to new and valuable features on iOS. Such features improve the user's quality of life in their interactions with

the-most-out-of-your-jailbroken-ios-device.

¹¹Dachis, "Your Jailbroken iOS Device."

¹²"Rejected Apps," iMore, 2014, <https://web.archive.org/web/20140715085458/http://www.imore.com/tag/rejected-apps>.

¹³Steve Kovach, "Frustration Builds with Apple's Inconsistent Rules for App Developers," Business Insider, April 13, 2013, <https://www.businessinsider.com/the-story-of-apples-confusing-inconsistent-rules-for-app-developers-2013-4>.

¹⁴Amboy Manalo, "60 iOS Features Apple Stole from Jailbreakers," Gadget Hacks, November 2, 2018, <https://ios.gadgethacks.com/how-to/60-ios-features-apple-stole-from-jailbreakers-0188093/>; Oliver Haslam, "9 Jailbreak Tweaks Apple Killed in iOS 9," Redmond Pie, June 10, 2015, <https://www.redmondpie.com/9-jailbreak-tweaks-apple-killed-in-ios-9/>.

the device, and a premium device necessitates a premium quality of life. The primary obligation the user holds to Apple is to uphold the EULA that they agree to abide by regarding the usage of their Apple device.

In response to jailbreaking your Apple device, there are three main options. The first is not jailbreaking your device whatsoever. The second is jailbreaking your device but only installing minimal tweaks. The third is jailbreaking and using your device without restriction, installing whatever tweaks you desire.

With these three options considered, it is helpful to analyze each alternative concerning the rights and obligations of each party involved. First, the no-jailbreak option must be explored. This option respects Apple's right to make iOS restrictions and to enforce their software license. Further, it fulfills Apple's obligation to make a profit, at least in the short term, since it ensures users only install the apps they intend, thus bolstering any profit Apple receives from approving these apps. It also wholly upholds Apple's obligation to provide safe software since Apple has complete control over the software on the device in this case. Regarding Apple's commitment to providing innovative features, though, this option needs to be improved: the only features available to users are those developed by Apple's developers, which restricts the total set of feature options to users.

In regards to the user, not jailbreaking your device has separate impacts. For one, it limits the user's right to customize their device. Likewise, it violates the user's right to new and valuable features. Still, this option does fulfill the user's obligation to follow the EULA since the user is not using the device in any unsanctioned manner.

Second, the jailbreak-with-minimal-tweaks option must be analyzed. While it does violate Apple's right to make restrictions on the functionality of iOS in modifying the operating system with the jailbreak, since the user installs only minimal tweaks on the device, the violation of Apple's restrictions is minimal. Apple maintains the right to enforce its software license should it discover the device is jailbroken. While the jailbreak may diminish Apple's short-term profits by providing the user with an alternative method of app installation, it also may increase Apple's profit in the long term as the user is contributing to a jailbreak community (simply by using tweaks or possibly even developing them) which produces new features which Apple may implement in the future. This option also helps fulfill Apple's obligation to provide innovative features to the user since the user may install a small number of beneficial tweaks without detracting from Apple's development power (as the jailbreak community develops the tweaks rather than Apple's developers). Finally, Apple's obligation to provide safe software is at risk since the jailbreak may remove security and safeguard features within the operating system. Still, with only minimal tweaks, the exponential impact of further risks due to additional unrestricted software installation is minimal.

It is likewise essential to analyze the rights and obligations of the user regarding jailbreaking your device with minimal tweaks. This option respects the user's right to customize their device but does not fulfill the request to the greatest extent since the user can only install minimal tweaks. Similarly,

this option partially fulfills the user's right to new features since the user may install a few ground-breaking tweaks. Finally, this option does violate the user's obligation to Apple to uphold the EULA since jailbreaking their device violates this agreement. However, only installing minimal tweaks keeps the violation to a minimal magnitude.

Third, the unrestricted jailbreak option must be analyzed. This option violates Apple's right to make iOS restrictions to the fullest extent since users may circumvent any limits they desire. Again, this option does not infringe on Apple's right to enforce its software license since Apple can still enforce the agreement on the user should they discover the device is jailbroken. This option also diminishes Apple's short-term ability to make a profit to the greatest extent since the user is free to install whatever software they wish, which will likely detract from the amount of Apple-approved software the user installs. Still, since the user is installing more tweaks, this option contributes most to Apple's long-term ability to make a profit since the user contributes highly to the jailbreak community's innovative features, which Apple may later utilize. Further, this option fulfills most of Apple's obligation to provide innovative features since the user is free to install unlimited tweaks, many of which are on the cutting edge of user experience and all of which are sourced from the entirety of the jailbreak community, rather than any of Apple's development bandwidth.

The rights and obligations of the user are crucial to analyze as well. Notably, this option provides the user the most significant opportunity to exercise their right to customize their device since the user can install whatever customizations they desire. Similarly, this option is the best in fulfilling the user's right to enjoy new features on iOS since they can enjoy the fullest extent of new features offered by the jailbreak community. Finally, this option violates the user's obligation not to break the EULA and does so reasonably strongly since the user may install whatever software they wish. Still, it is essential to note that since jailbreak users are a subset of all Apple's users, this option does not violate Apple's EULA en masse; instead, it only breaks it at a local level.

Now, in evaluating these options, it is helpful to consider the application of Social Contract Theory. In this instance, the application assumes a representative of Apple and a representative of Apple's users enter a room to discuss the issue. Still, upon entering, they forget which party they represent. Thus, the outcome of the discussion will protect the most vulnerable party involved since either representative could be a member of that weak party.

In such a discussion, both individuals would identify that the user, fully susceptible to what Apple permits in its software, is the most vulnerable. Further, both parties would find Apple's profit and reputation robust to users jailbreaking their devices since jailbreak users are a mere subset of Apple's total users. Thus, faced with the three options mentioned earlier, the parties would agree on the free jailbreak: it generates the most significant profit for Apple in the long term while wholly protecting the user's rights to enjoy their device uniquely.

Other ethical frameworks help judge these options as well. Namely, the doctrines of utilitarianism (focusing on the outcome), deontological theory (fo-

cusing on the actions), and virtue ethics (focusing on the growth of the parties involved) are essential.

First, not jailbreaking your phone can be considered within these frameworks. Utilitarianism would judge this option as ethical since this is the only option that does not violate the EULA because it is the only option that does not put jailbreak software on the device. From a deontological theory perspective, this option is ethical since the user uses their phone as usual. Using their phone as usual does not raise any ethical concerns, as this is what Apple intended when selling the device to the user. Finally, in terms of virtue ethics, this option is highly unethical. Apple's potential is limited since the user does not have the chance to support the jailbreak community's features, and, likewise, the user's potential is limited because they are not able to gain the computing skills, UI design skills, and possibly even the tweak development skills they would have achieved with a jailbreak.

Next, jailbreaking your phone with minimal tweaks may be considered via these ethical frameworks. To address utilitarianism, the outcome of the user violating the EULA is unethical. Still, due to the impact of a small number of jailbreaks among their users being somewhat limited, this option is not egregiously unethical. Further, from a utilitarian standpoint, there is even a slight ethical upside since the minimal jailbreak allows the user to indulge in some tweaks to their system. Deontological theory also would judge this option as unethical, albeit to a small extent. Regardless of the number of tweaks, the user is taking actions prohibited by Apple, making the option unethical. Still, the user's actions, especially with these minimal tweaks, are working to balance their needs for features with Apple's need for a safe operating system as best as possible. From a virtue ethics framework, this option is ethical but not the most favorable. It allows Apple to dabble in some benefits from jailbreak features while the user benefits from some technological understanding, as was missed in the no-jailbreak option.

Third, jailbreaking your phone and using it without restrictions can be judged in these frameworks. From the perspective of utilitarianism, the EULA is violated, as in the minimal jailbreak option, which is unethical to an extent. Yet, the jailbreak results in Apple and the user enjoying the benefits of the features, which provides significant benefits to both parties, so utilitarianism reservedly supports this option. Regarding deontological theory, the actions are unethical because Apple prohibits them. However, in jailbreaking their device, the user considers their needs for features to the fullest extent, which means this framework also conservatively supports the option. From the virtue ethics standpoint, this option is very favorable. With this option, Apple gets the most benefit in terms of features due to the jailbreak user becoming entrenched in their iOS knowledge as they dive further into various tweaks. Similarly, the user gets the highest benefit of technological acumen with this option, as the user can utilize the jailbreak to the fullest extent possible, learning along the way.

Ultimately, the most ethical option is an unrestricted jailbreak, with a caveat: the user must actively learn from and participate in the jailbreak community. The user jailbreaking their device does violate EULA, which goes

against deontological theory. Yet, the user gets a highly-customizable and thus the best experience, which satisfies utilitarianism. Further, Apple can learn from new features used and developed by tech-savvy jailbreak users, which satisfies virtue ethics. Additionally, the social contract analysis confirms the unrestricted jailbreak as the best option because the negative impact is negligible on Apple if tech-savvy individuals use the jailbreak and refrain from publicizing issues caused by it. The positive effects on users and Apple from enjoying the spoils of jailbreak features are rather significant.

Regarding downloading specific tweaks being ethical, the question would have to be case by case. Some tweaks are UI customizations, while others allow pirate versions of paid App Store apps and free in-app purchases. Regardless, allowing a tech-savvy user unrestricted access to these tweaks is ethical. In all reality, the tech-savvy are not using jailbreaks for pirating but more for iOS development and personal UI customization.¹⁵

Ultimately, jailbreaking your iPhone helps you with technological insight and allows Apple to work even more intensely as tweaks are tested and further developed. Thus, it is only logical that jailbreaking your iPhone is ethical, as it forwards humanity's technological progression.

¹⁵ Jonathan Zdziarski, *iPhone Open Application Development: Write Native Applications Using the Open Source Tool Chain* (Sebastopol: O'Reilly Media, Inc., 2008); Ted Landau, *Take Control of Your iPhone* (TidBITS Publishing, Inc, 2009).

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