Zap Droid: Managing Infrequently Used Applications on Smartphones

Abstract:

User surveys have shown that a typical user has over a hundred apps on her smartphone, but stops using many of them. We conduct a user study to identify such unused apps, which we call zombies, and show via experiments that zombie apps consume significant resources on a user's smartphone and access her private information. We then design and build ZapDroid, which enables users to detect and silo zombie apps in an effective way to prevent their undesired activities. If and when the user wishes to resume using such an app, ZapDroid restores the app quickly and effectively. Our evaluations show that: (i) ZapDroid saves twice the energy from unwanted zombie app behaviors as compared to apps from the Play Store that kill background unwanted processes, and (ii) it effectively prevents zombie apps from using undesired permissions. In addition, ZapDroid is energy-efficient, consuming $< 4\%$ of the battery per day

Introduction:

There has been an explosion in the number of third-party smartphone apps that are available and are being downloaded. The Google Play Store has more than 1.3 million apps and a report in states that the number of downloads of apps from the Play Store between May'13 and July'13 alone was about 2 billion. However, after users interact with many such apps for an initial period following the download, they almost never do so again. Statistics indicate that for a typical app, less than half of the people who downloaded it use it more than once; further, 15% of the users never delete a single app that they download. In more general cases, users may only interact with some downloaded apps infrequently (i.e., not use them for prolonged periods). These apps, which are seemingly considered dead by the user, continue to operate in the background long after the user has stopped interacting with them. Such background activities have significant negative impacts on the user, e.g., leaking private information or significantly taxing resources such as the battery or network. Unfortunately, the user is completely unaware of these activities. We call such apps,

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which are dead from the perspective of the user, but indulge in undesired activities, as "zombie apps"

The classification of an app as a zombie app is inherently subjective. After an app goes unused by a user for a prolonged period, the determination of whether the app should be constrained depends on whether the app's resource usage during the period of unused is considered significant or whether the app's access of private data is deemed serious. Therefore, instead of automatically categorizing apps as zombie apps, we seek to empower the user by exporting the information that she would need to make this decision. Moreover, the manner in which a zombie app should be quarantined depends on whether the user is likely to want to use the app again in the future (e.g., a gaming app that the user tried once and decided is not interesting vs. a VoIP app that the user uses infrequently). The apps that a user is likely to use again fairly soon should not be fully uninstalled; real time restoration (when needed) may be difficult if the user does not have good network connectivity. We seek to enable users to deal with these different scenarios appropriately