

Bugu: An Application Level Power Profiler and Analyzer for Mobile Devices

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Abstract

Mobile devices, such as smart phones and tablets, have become an integral part of our daily life, providing a lot of fancy and powerful applications [1]. There is no doubt that more and more applications make our life more convenient and colorful, but they are also big energy consumers on mobile devices and significantly influence battery lifetime and user experience. To understand and solve the battery drain problem, we design and implement the **Bugu** service which targets the applications running on mobile devices, analyzes event-power relationship, and provides users an overview of the power behavior of applications. We envision that three groups of people will benefit from the Bugu service. For end users, they know applications' power behavior which in turn helps them to decide which applications to install and run. For application developers, they could understand which events cause such amount of power dissipation and focus on optimizing them. For system developers, the insights provided by the Bugu service will enable them to understand the potential problem of the system so that further optimization can be enhanced.

As Figure 1 describes, the Bugu service includes two parts: the Bugu server and the Bugu client. The Bugu server collects applications' power information on each device and supports the Bugu client with these data, so end users get more suggestions when they choose applications and application developers know their products' difference with others in the aspect of power. The Bugu client is used to monitor application power consumption, monitor events and analyze these information. Application developers know the event information of their applications, so that these power hotspots can be optimized. Besides, Bugu also supports power variation figure of background processes for system developers to analyze, which is helpful for them to adopt power saving mechanism.

We found that the system processes, such as *rild*, *wpa_supplicant*, *systemui*, consume much energy even

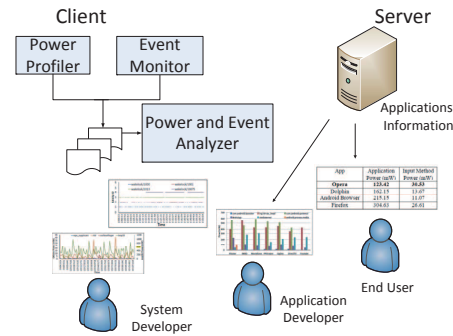


Figure 1. The overview of Bugu

in background. Besides, wakelock causes a particular “no sleep” bug [2] and the hardware interrupts generated by sensors in the mobile devices also consume a lot of energy. If operating systems provide more energy efficient APIs/services for developers, the energy of applications will automatically decrease. From the comparison data recorded in the Bugu server, we know the applications have different power behavior even with same functionality, and users prefer to choose energy-friendly software. So, it is possible and necessary to optimize applications' energy [3, 4].

References

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