

Fully Automated UI Testing System for Large-scale Android Apps Using Multiple Devices

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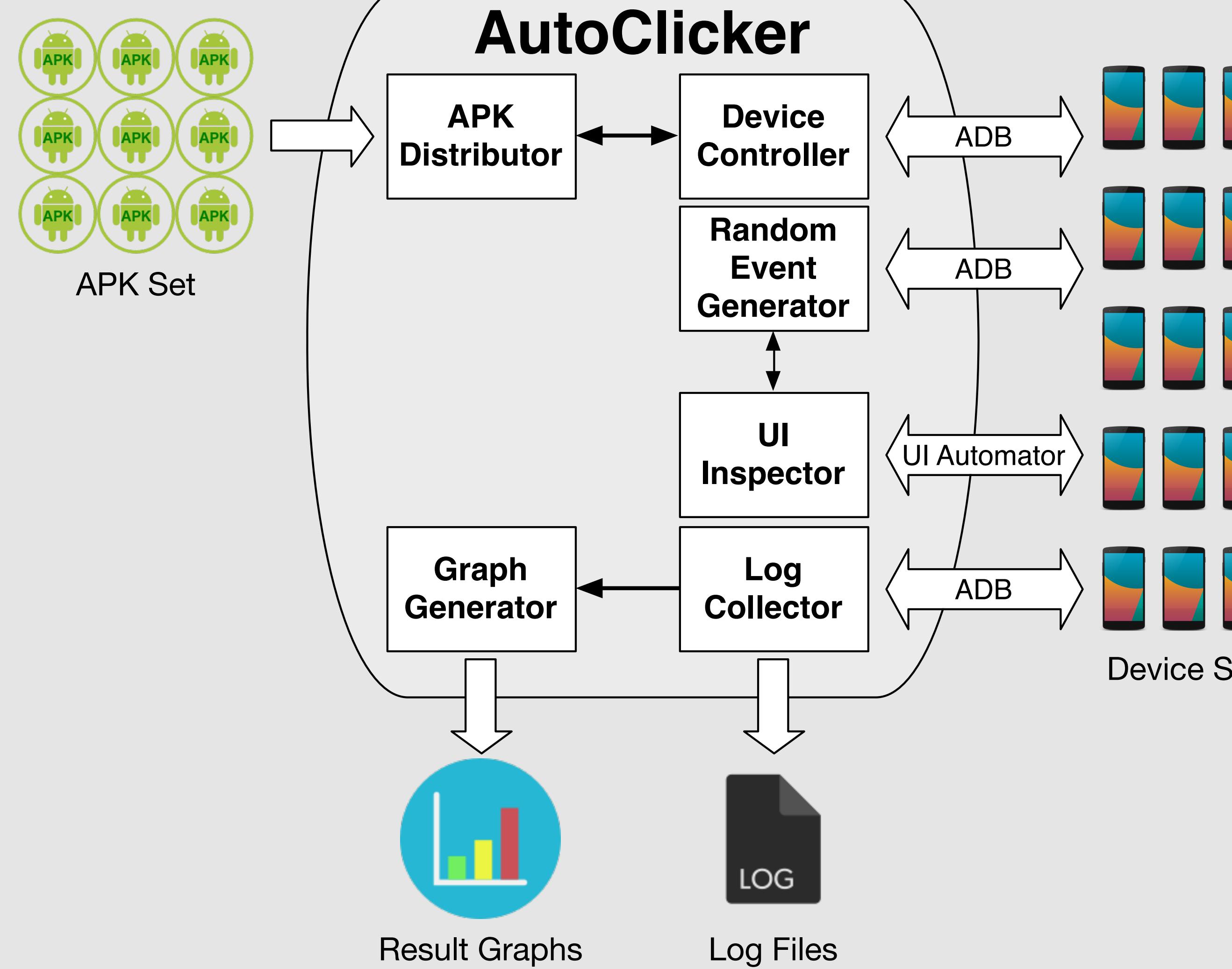
Abstract

We demonstrate **AutoClicker**, a fully automated UI testing system for **large-scale** Android apps using **multiple devices**. It provides a way to quickly and easily verify that a **large number of** Android apps behave correctly at runtime in a repeatable manner.

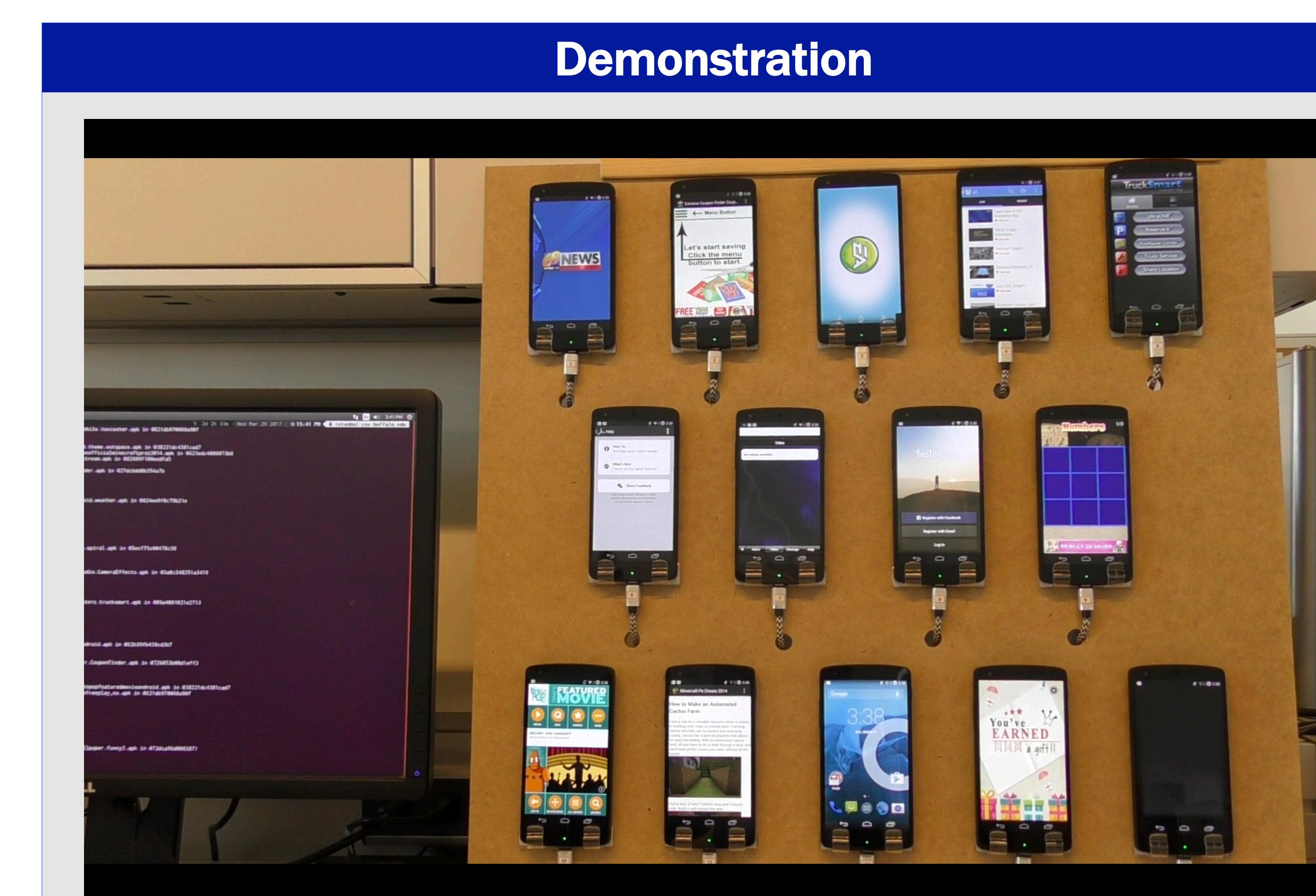
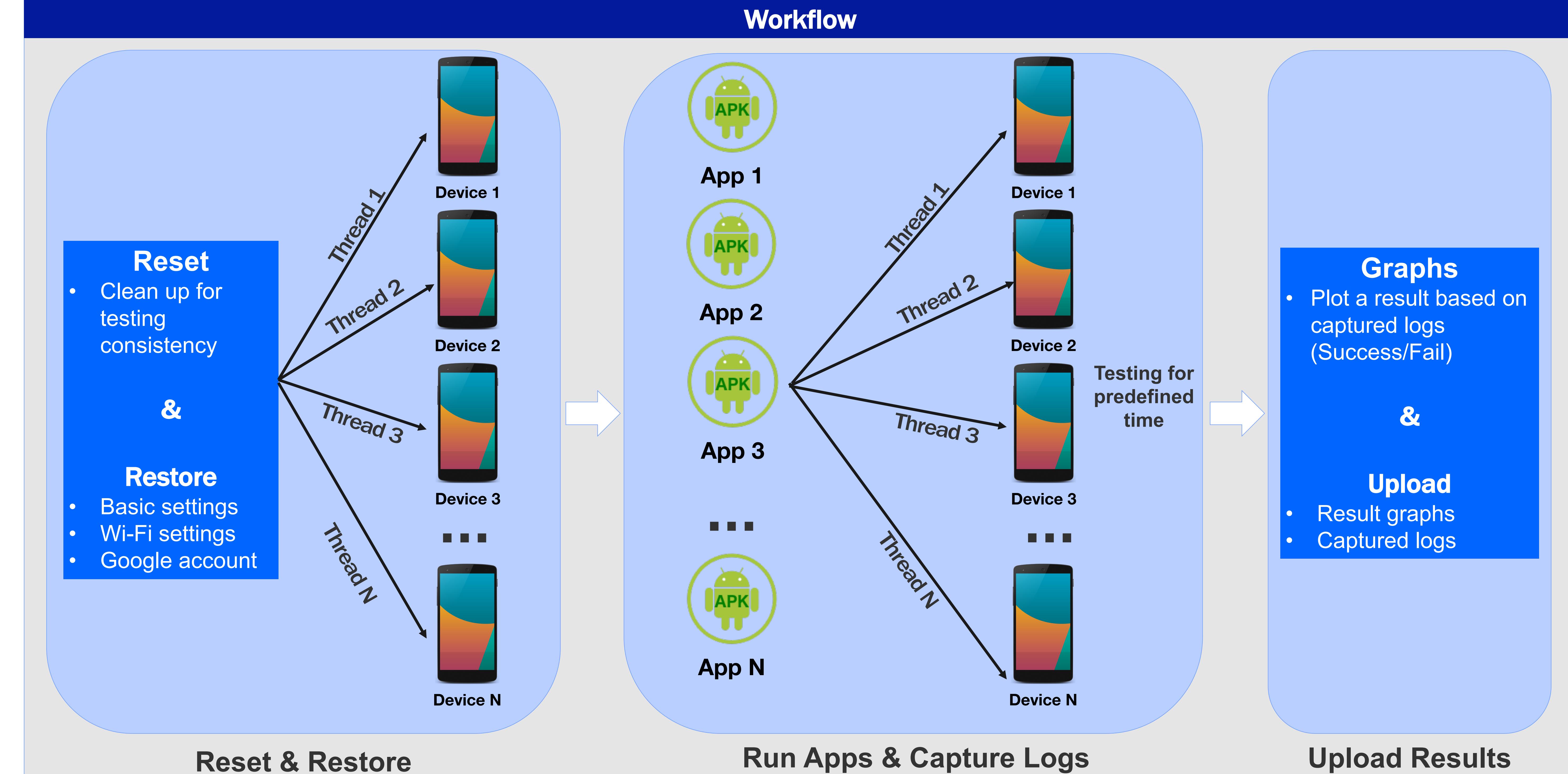
Motivation

1. Recently, app instrumentation techniques are widely used for research in academia and in the industry to achieve different goals.
 - i. Improving energy efficiency for always-on sensing [1],
 - ii. Providing mobile deep links [2].
2. One can easily check that instrumented apps are correctly transformed at compilation time with compiler validation.
3. However, verifying if a **large number of instrumented apps behave correctly at runtime** is still challenging and time-consuming.
 - i. **Difficult to schedule many apps for testing** and to use multiple devices in parallel in order to facilitate testing
 - ii. **Burden to understand app testing APIs and libraries**, and to build a system using them.

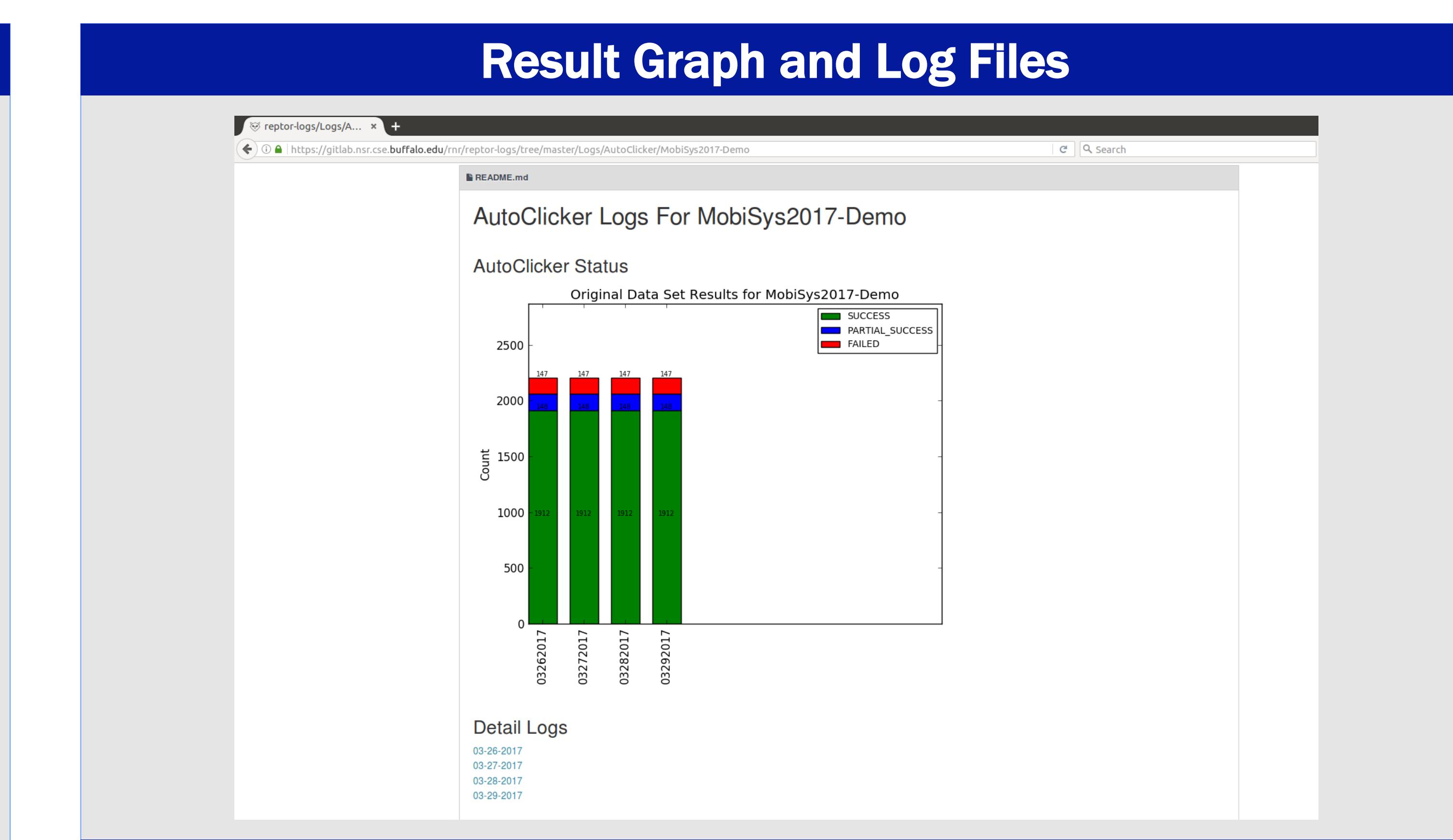
AutoClicker Architecture



- **Device Controller:** Detecting all devices connected to AutoClicker, and checking device conditions such as battery level, occupied status, and so on.
- **APK distributor:** Selecting a device and an app that is not tested yet. It installs and launches the app on a device to start testing.
- **UI Inspector:** Inspecting all UI elements and their hierarchy for an app running on a device using Android UI Automator[3].
- **Random Event Generator:** Generating random UI events such as button clicks and text input.



1. AutoClicker builds on a desktop connected to 13 Nexus 5 devices running Android 4.4 for Dalvik and Android 6.0.1 for ART.
2. In this demo, we test 2,207 apps downloaded from Google Play for one minute 10 times.
3. During testing, AutoClicker will verify if the runtime behavior of each app in the test set is correct.



References

- [1] H. Shen, A. Balasubramanian, A. LaMarca, and D. Wetherall. Enhancing Mobile Apps to Use Sensor Hubs Without Programmer Effort. In *Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing, UbiComp '15*, 2015.
- [2] T. Azim, O. Riva, and S. Nath. ulink: Enabling user-defined deep linking to app content. In *Proceedings of the 14th Annual International Conference on Mobile Systems, Applications, and Services, MobiSys '16*, 2016.
- [3] Android UI Automator. <https://goo.gl/xSzxoj>.