Monitoring Android Applications for SecLTL formulas.

Android has a huge number of diverse applications. And most of these applications exchange and share data with other applications, moreover most of them are intended to function on users' personal or confidential data like user contacts, bank account details, credit card details, and user details. Hence, the guarantee that the program does its intended purpose and handles users' personal or confidential data with care becomes very significant.

The goal of this work is to present a way of monitoring Android applications for SecLTL formulas. SecLTL, a recently proposed temporal logic, is an extension of LTL with a new Hide operator which can specify information flow properties. Information flow properties in security are properties that ensure that the program will not leak any confidential information to the observer or attacker. It is essential that in reactive systems, the secrecy requirements of confidential information may be changed over time depending on the environment it interacts with. In some cases, it might be required to reveal confidential information in order to correctly fulfill other functions. SecLTL also can specify when and under which conditions private information must not leak to public output.

In this work we present the framework for monitoring Android applications for SecLTL formula and its algorithm for implementation. The core idea is to dynamically execute the application, and trace its execution. And while tracing its execution at run-time we monitor SecLTL formula. Monitoring SecLTL formula is based on constructing its alternating automaton, and traverse automata using an on-the-fly technique.

Contributions

This work has three main contributions:

- Framework to monitor SecLTL properties for programs without requiring its transition system in the automaton construction.

- Dalvik bytecode instrumentation method to enforce the application to generate its execution trace at runtime.

- Experimental results on three Android applications.