Multilevel Android Exploit Protection

Boston University – Metropolitan College (MET)

Felix Rohrer, Nebiyu Feleke, Kenneth Nimley

Supervised by: Yuting Zhang, Lou Chitkushev, Tanya Zlateva

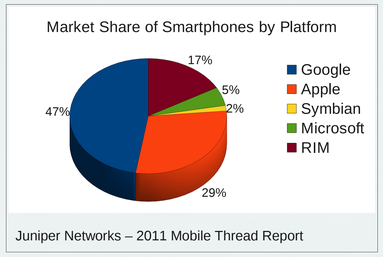
Abstract #99

Smartphones have become an emerging platform for both personal and business applications.
As the most popular mobile operating system for smartphones, Android offers great flexibility not only for users but also for application developers. However, this flexibility exposes users to additional security threats. This poster describes our ongoing research effort towards Android security issues. We first instantiate two types of possible attacks that can be launched on current Android applications available on the market.
To further explore the vulnerabilities, particularly in the finance and health sector, we are developing a tool that leverages data mining techniques to automatically extract and analyze the security information of these applications, in order to detect and report the potential security threats. Moreover, we have analyzed and categorized more than a dozen security solutions proposed by different research groups. This poster provides a concise overview of this survey result. Most tools prevent potentially malicious communication within the Android operating system by repeatedly checking all communication channels and making security decisions based on a predefined security policy. Addressing the limitations of the current approaches, we propose two directions for further research. First is to implement a probabilistic protection mechanism as part of the Android framework that leverages the historical data to make better security decisions while reducing the energy overhead. The second proposed research direction is developing an Eclipse plug-in to prevent attacks by educating developers to write more secure Android applications.

Android Overview

Operating System for Mobile Devices

Based on Linux



Juniper Networks – 2011 Mobile Thread Report

Android Market reached **10 Billion App downloads** by December 2011

Growth rate of **1 Billion App downloads per month**

450'000 Apps

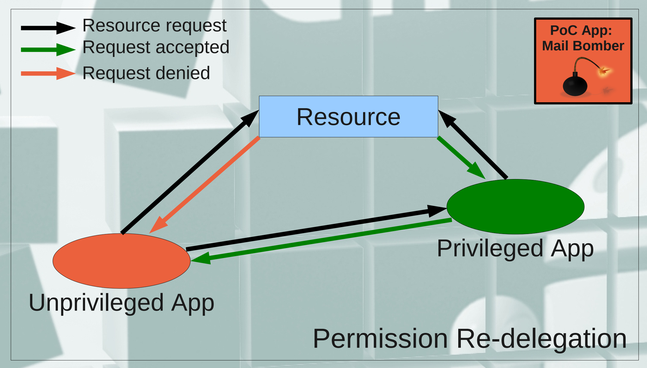
Android Security

Each App runs in its own Virtual Machine (Dalvik), therefore isolated from other Apps.

Inter-application communication provided by Android Framework (very flexible but introduces vulnerabilities)

Resources are labelled with permissions (i.e. INTERNET, RECEIVE_SMS)

Two Proof of Concept Attacks

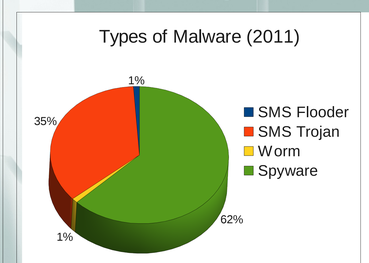


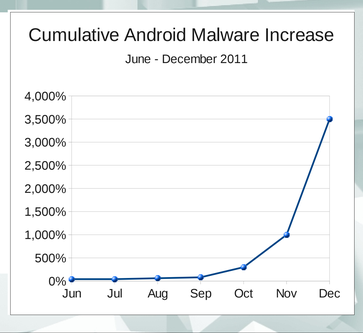
Permission Re-delegation

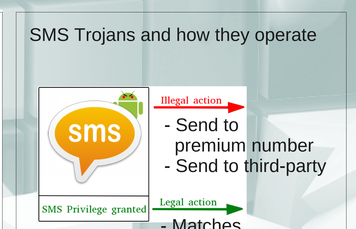
Application Phishing

Malware analysis

Source: Juniper Networks – 2011 Mobile Thread Report





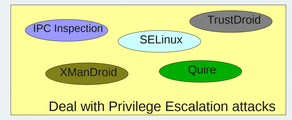


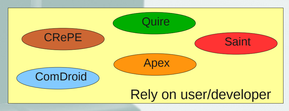
Current solutions

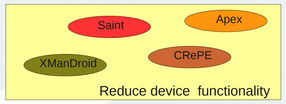
Analyzed **13 security solutions** from different research groups

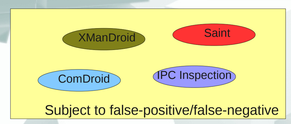
8 solutions introduce **substantial overhead** (delays or energy consumption)

11 solutions require modification of framework code and therefore difficult to distribute

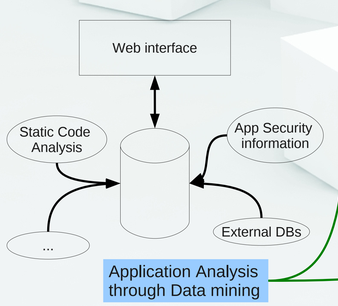


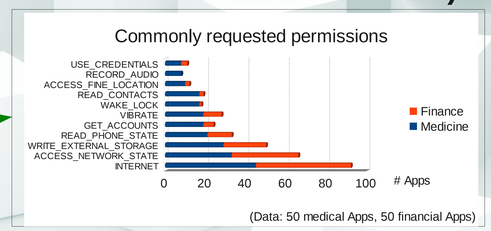


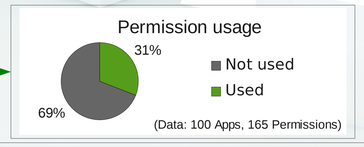




Our current research (focus: Finance and Medical sector)

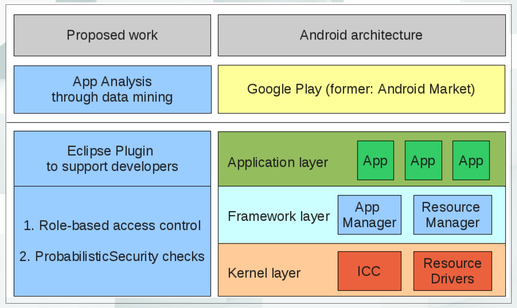






Educate developers to write secure Code

Add a mock-up screen here from the Eclipse Plugin



Proposed work

- Provide Security on several levels
- Create an access control based on roles in order to simplify dealing with permissions
- Minimize energy consumption of solution by introducing probabilistic security checks