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Mourad Leslous, Jean-François Lalande, Valérie Viet Triem Tong

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Using Implicit Calls to Improve Malware Dynamic Execution

M. Leslous  J.-F. Lalande  V. Viet Triem Tong
INRIA/CENTRALESUPELEC research project Cidre – INSA CVL
France

Dynamic Analysis: The Need for Malware Triggering

- Malware evade dynamic analysis
- Wait for: a specific time, an event, C&C command
- If suspicious code is triggered
  → Capture dynamic behavior

GroddDroid: a Gorilla for Triggering Malicious Behaviors

- Locates the suspicious code
- Builds an interprocedural control flow graph
- Finds a path that reaches the suspicious code
- Instruments & Executes APK

Problem: Execution paths May Use Implicit Calls

- Alarm Controller (com.al.alarm.controller)
- SHA256: 03c32aca9f894ba8a7263e65fe8845a53618f1131877c8b818d018e2d07e2f596
- Decrypts and loads code dynamically
- Installs malicious apps
- Displays unwanted ads
- Malicious code execution path contains an implicit call:
  `AsyncTask.execute()` → `AsyncTask.doInBackground()`
- GroddDroid cannot find such a path because of implicit calls

Challenge
Discover execution paths with implicit calls to reach suspicious code

Including Implicit Calls into CFGs

- Without implicit calls
  - Suspicious code execution rate for this sample: 37.5%
- Use pairs of registration-callback
  - Suspicious code execution rate for this sample: 87.5%

Executing Malware

- Program designed and implemented
- Experiments on large sets of malware
- Measure malicious code coverage with and without implicit calls
- Online malware analysis platform

Contact: mourad.leslous@inria.fr