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## Towards Automatic Triggering of Android Malware

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# Towards Automatic Triggering of Android Malware

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## The problem: malware hiding techniques

Malware wait before running to evade dynamic analysis

- ▶ a fixed or dynamic period of time
- ▶ a user input
- ▶ a system event
- ▶ an order from a remote server
- ▶ a particular state of their hosted application
- ▶ something else ?

## Existing solutions

Some frameworks proposed to test the infected application

1. using random inputs
2. running a maximal branches of code

BUT

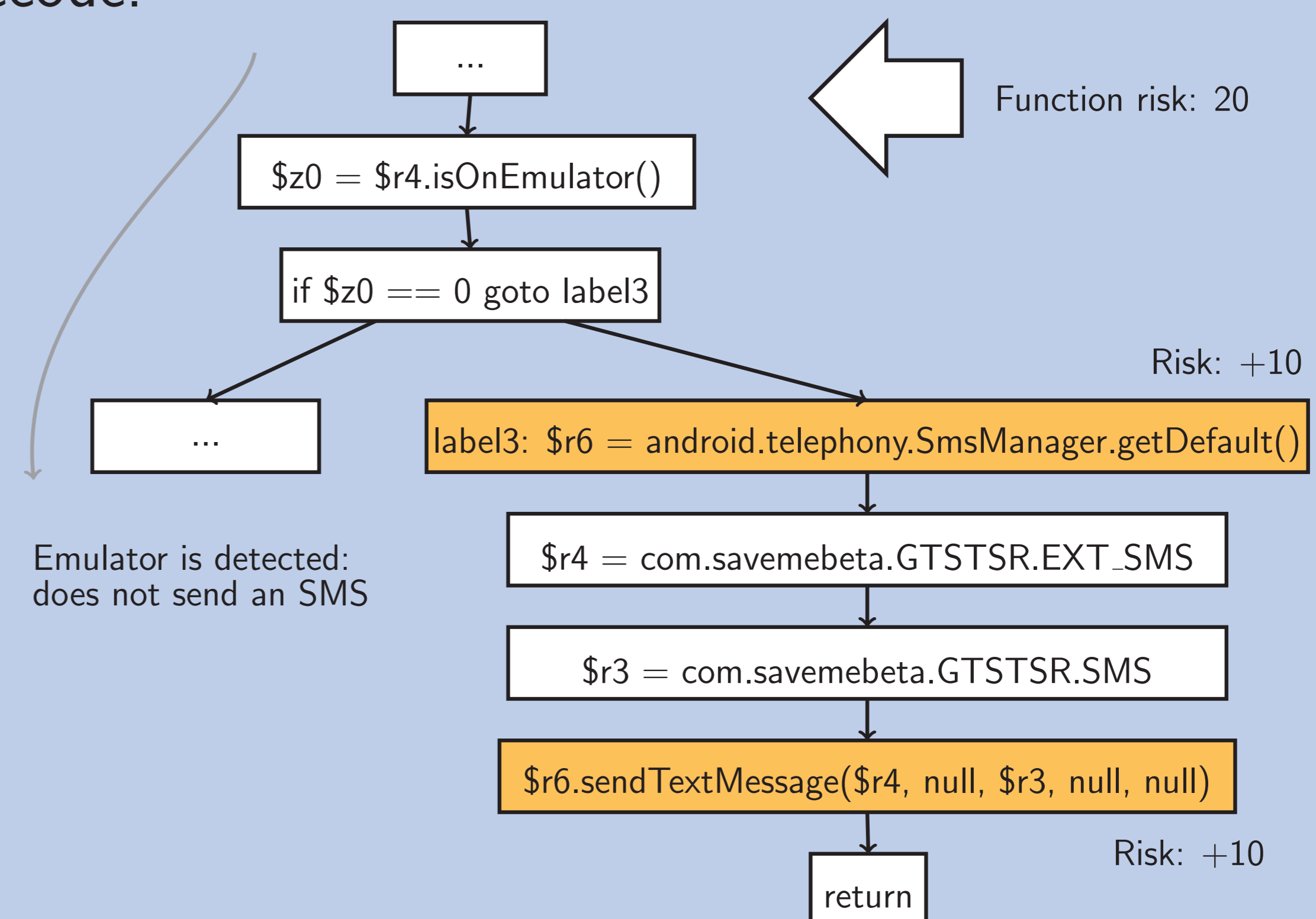
1. it is uncertain
2. it is unnecessarily expensive

## First step: static identification of malicious code

A **scoring function** computes an **indicator of risk** for each instruction in the bytecode.

The score increases with calls to specific Java methods such as:

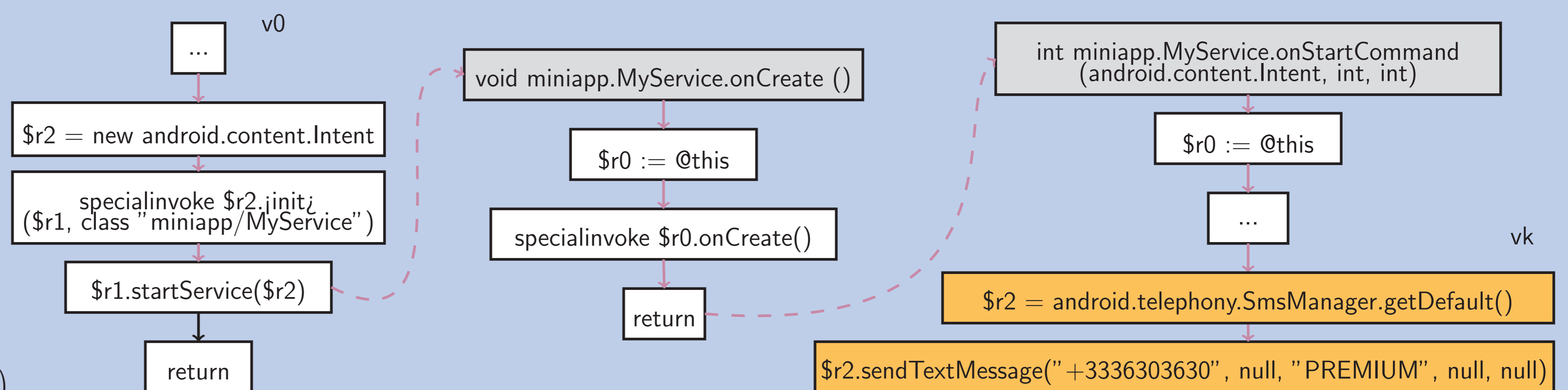
- ▶ android.telephony.SmsManager for sending SMS
- ▶ android.telephony.TelephonyManager for getting device infos
- ▶ android.context.pm.PackageManager for installing/removing apps
- ▶ java.util.Timer, TimerTask for the implementation of *timebombs*
- ▶ java.lang.Runtime, Process for executing native binaries
- ▶ dalvik.system.DexClassLoader for loading code dynamically



## Second step: recomputing an execution path to the identified malicious code

To compute an **execution path** to the **most scored unit** of code:

- ▶  $\forall f$ , functions of the malware, compute:  $G_f = (V_f, A_f)$ . Let  $G = \cup_f G_f = (V, A)$
- ▶  $\forall$  intents, events from  $v_i \in V_i$  to  $v_j \in V_j$ : Add  $(v_i, v_j)$  to  $A$
- ▶ Let  $v_k$  the scored unit of code
- ▶ Let  $v_0$  the entry point (`onCreate()`)
- ▶ Compute  $path = shortest\_path(G, v_0, v_k)$



## Third step: forcing the execution path

To **force the execution** of the most scored unit of code  $path$ :

- ▶ Make a *standard* execution
- ▶ Let  $path = (v_1, \dots, v_e, \dots, v_k)$ :  $v_e$  is the last unit of code executed.
- ▶  $\forall i > e > k$ , if  $v_i$  is a condition, **Force**( $v_i$ )
- ▶ Execute the malware again.

Benefits:

- ▶ a malware that is executed shows its effects
- ▶ detection tools can be trained or evaluated

