Giving developers the power to declare **per-component** access control **policy** for their apps

SEApp: Bringing Mandatory Access Control to Android Apps

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PROBLEM STATEMENT

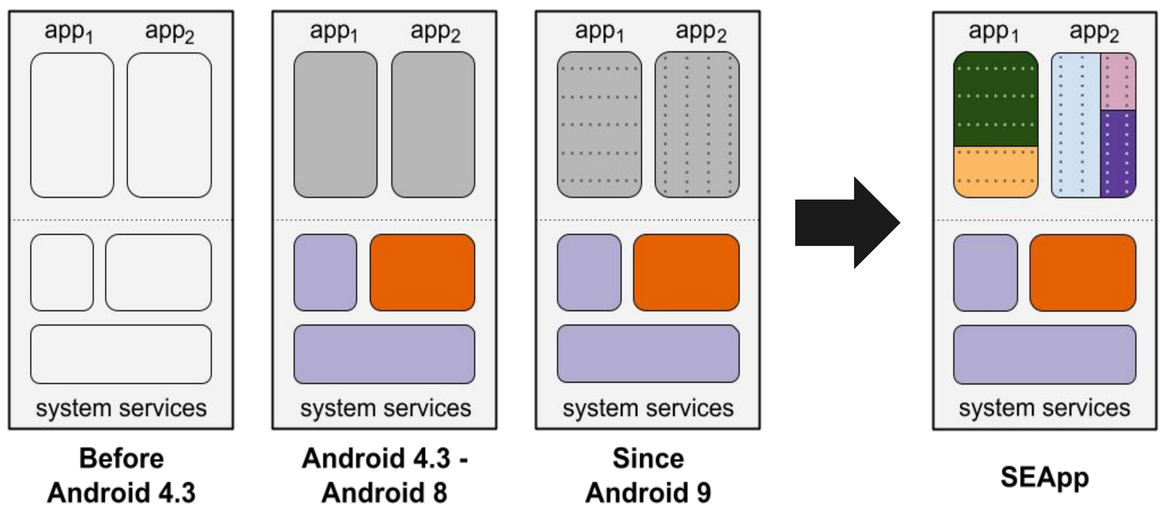
Android focuses on isolating applications from each other

There are no means to isolate components internal to the app:

- every component has **complete access** to the **internal storage**
- 3rd-party libraries may **abuse** app **privileges**
- large and complex **components** prone to bugs are **not easy to isolate**

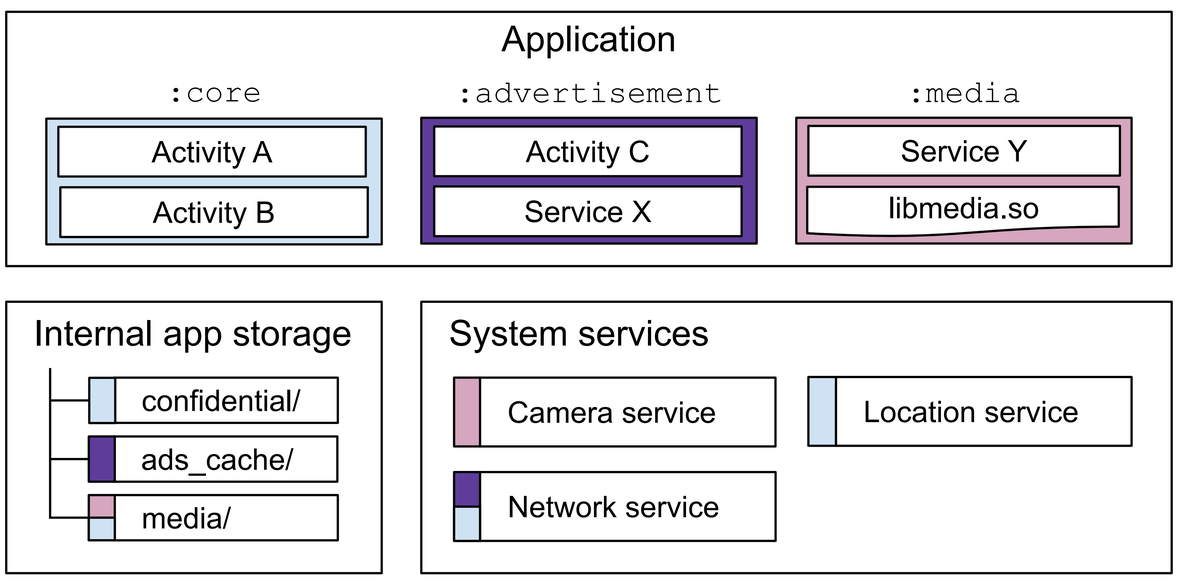
OBJECTIVE

- divide applications into multiple **security contexts**
- **restrict** security context **access** to **internal storage** and system **services**
- control **interactions** among security contexts



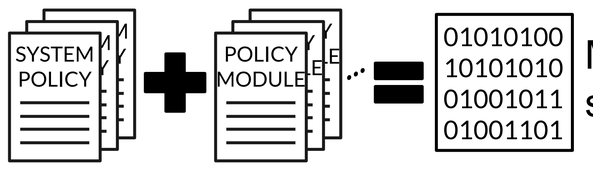
PROPOSAL

- **separate components** into **different** app **processes**
- control with **SELinux** the permissions at process level



IMPLEMENTATION

Fine-grained application **policy** module to control the permissions granted to processes



Merge all policy fragments into the same **monolithic binary policy**

A **compiler-based** approach **prohibits** the installation of policy modules that may **harm** the system or other apps

Several changes to:

- **boot** sequence
- app **installation** procedure
- **services** to support the app lifecycle (e.g., Zygote)

RESULTS

- **limited** app **installation overhead**
  Worst case: ~4s
- no deterioration of the start-up time of components running inside different processes
- running processes provide **warm start of** their **components**
  Activity: ~125 ms→~15 ms **Service:** ~105 ms→~2.5 ms
- unaltered communication overhead between components belonging to different processes
  IPC: ~200 µs
- **slow down of file creation** due to the use of a new system service to update security contexts of files
  Security context update: ~450 µs

DISCUSSION

- by mapping **security contexts** to activities and services, developers can **limit** the impact of a **vulnerability** on both the app and the end user
- our proposal is **consistent with the evolution of Android** and the desire of its designers to let app developers have access to an extensive and flexible collection of security tools
- experimental evaluation shows that the **overhead** introduced by our proposal is **limited** and **compatible with** the additional **security guarantees**