Capabilities as a Solution against Tracking Across Android Apps

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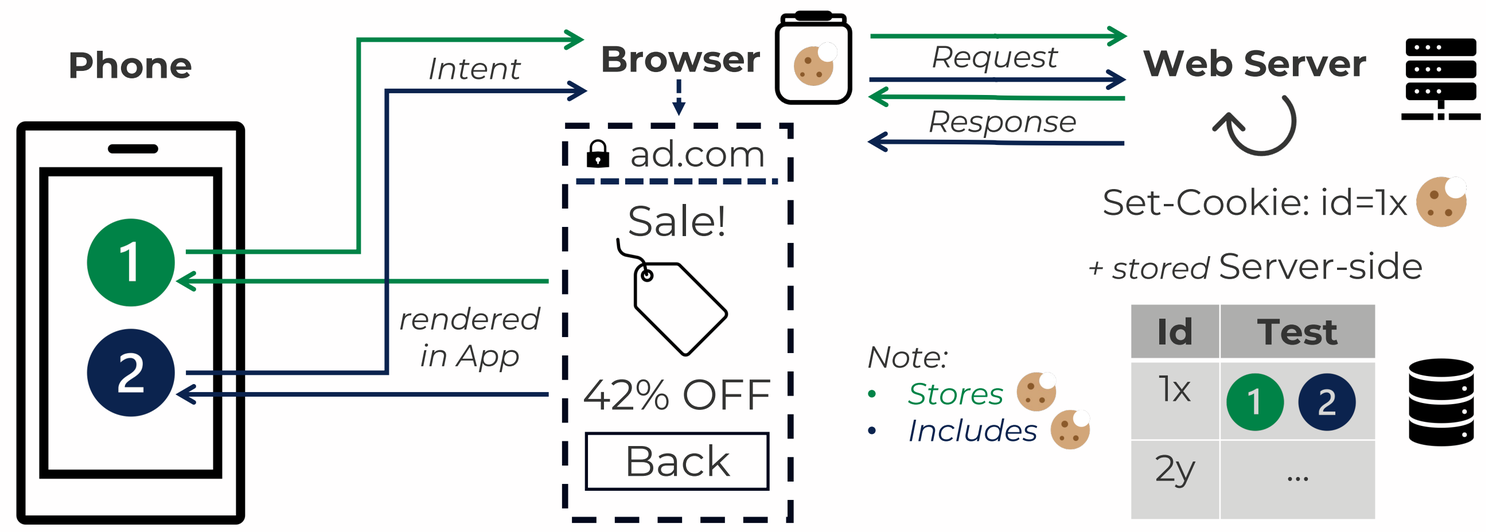
Intro & Motivation

- Custom Tabs (CTs) & Trusted Web Activities (TWAs) let Android apps embed content seamlessly (SSO, ads)
- Privacy Gap: Use of shared browser cookie jar → Third-party libraries can cross-app track (HyTrack)
- Currently no ideal solution: e.g., Browser State Partitioning separates all cookies → blocks SSO

The Problem: HyTrack



Proposed Solution: Capability-Based Cookie Isolation

Key Idea

Block HyTrack by scoping untrusted domains to app-local jars, while letting trusted sites share cookies.

- **Developer-defined policy**
  List trusted vs. untrusted domains (domain, store location)
- **Browser as PEP**
  On each CT/TWA launch, the policy is enforced: the browser either stores cookies in global jar or confines them to the app

Capability Token

- A signed JWT-style wrapper that encodes the cookie and metadata:

➢ App ID & Version Number, Domain, Rights, Global-jar flag

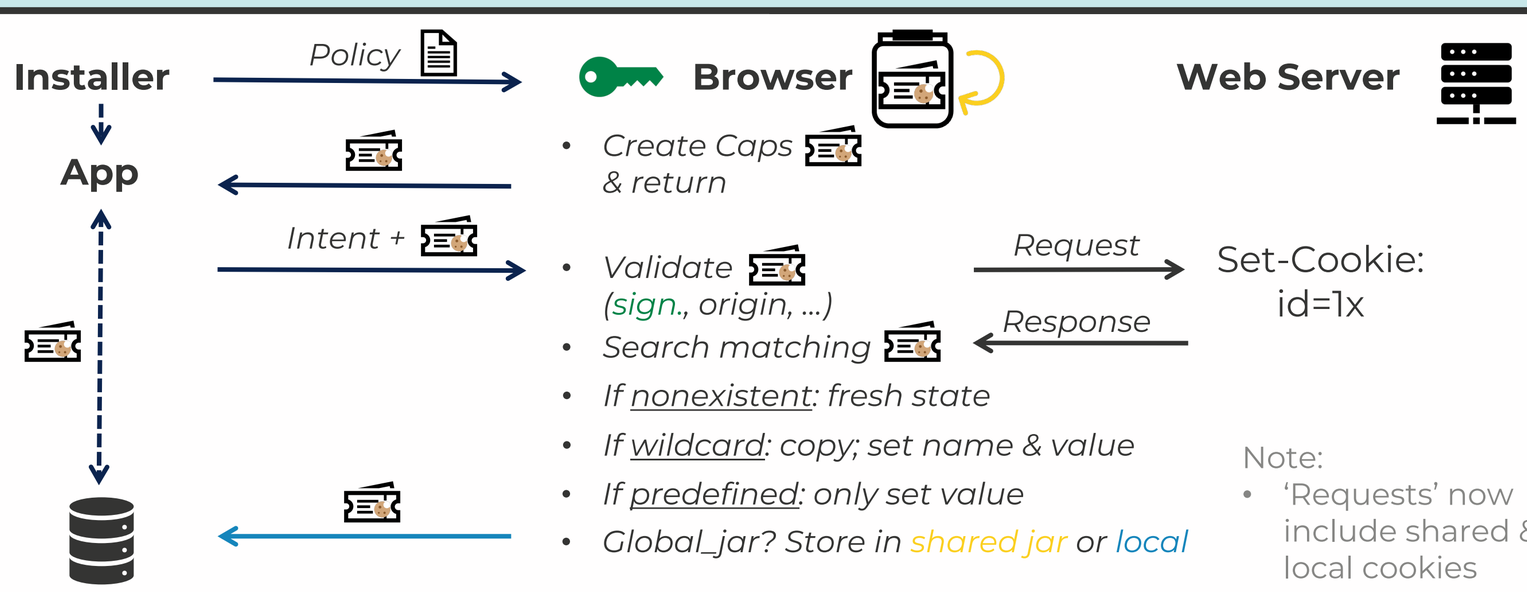
Different Types:

- *Wildcard Cap*: Empty name & value
- *Predefined Cap*: Predefined name
- *Ambient Cap*: Global-jar flag set

Benefits

1) ***Fine-Grained Control:***
   Developer specifies which cookies are shared or isolated
2) ***No Browser State for Apps:***
   App holds and sends capabilities
3) ***No Third-Party Code Changes:***
   All cap management in browser
4) ***Backwards Compatibility:***
   No policy→ Ambient Cap→ state-of-the-art behavior (shared jar)

Cookie Handling Flow



Causes & Fixes

- All apps using CTs/TWAs implicitly share cookies
  → Cookie management depends on capabilities
- Browser is limited in knowledge of app-context (forgets after request)
  → *App ID allows for* per-app cookie policies
- Third-party libs gain unrestricted access to the shared browser jar
  → Malicious third-party domains are confined to app-local storage

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This poster is based on the following publications:
1. M. Wessels, S. Koch, J. Drescher, L. Bettels, D. Klein, and M. Johns, "Hytrack: Resurrectable and persistent tracking across android apps and the web," in 34th USENIX Security Symposium (USENIX Security 25)

GitHub: https://github.com/timchr42/thesis