

Universität des Saarlandes
MI Fakultät für Mathematik und Informatik
Department of Computer Science

Bachelorthesis

Capabilities as a Solution against Tracking

submitted by

Tim Christmann

on January 01, 1970

Reviewers

Dr. Sven Bugiel

Noah Mauthe

Eidesstattliche Erklärung

Ich erkläre hiermit an Eides statt, dass ich die vorliegende Arbeit selbständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel verwendet habe.

Statement in Lieu of an Oath

I hereby confirm that I have written this thesis on my own and that I have not used any other media or materials than the ones referred to in this thesis.

Saarbrücken, January 01, 1970,

(Tim Christmann)

Einverständniserklärung

Ich bin damit einverstanden, dass meine (bestandene) Arbeit in beiden Versionen in die Bibliothek der Informatik aufgenommen und damit veröffentlicht wird.

Declaration of Consent

I agree to make both versions of my thesis (with a passing grade) accessible to the public by having them added to the library of the Computer Science Department.

Saarbrücken, January 01, 1970,

(Tim Christmann)

What is the dedication page?

Yes, you can

Abstract

Write the abstract.

Acknowledgements

Thanks Obama, Sven and Noah Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Contents

Abstract	vii
Acknowledgements	ix
List of Figures	xiii
List of Tables	xv
1 Introduction	1
2 Related Work	3
3 Methodology	5
4 Evaluation	7
5 Schedule	9
6 Success Criteria	11
Bibliography	13
Additional Something	15

List of Figures

List of Tables

Chapter 1

Introduction

Write the introduction.

In recent years, Android applications have increasingly leveraged web content within their interfaces to enhance user experience and streamline features such as authentication and monetization. To enable this, developers often use Custom Tabs (CTs) and Trusted Web Activities (TWAs), technologies that provide seamless, browser-backed web integration while maintaining native-like performance and features. This approach allows web-based functionality like Single Sign-On (SSO), for example login via Facebook or embedded advertising, without forcing users to switch between app and browser.

However, these benefits come at a cost. CTs and TWAs share the browser’s cookie storage across all apps, enabling continuity of web sessions—but also opening serious privacy vulnerabilities. Recent research by Wessels et al. introduced HyTrack, a novel tracking technique that exploits this shared browser state to persistently track users across different applications and the web, even surviving device changes, cookie clearing, or browser switching [1]. HyTrack works by embedding a third-party library into multiple unrelated apps. Each app, unaware of the library’s true purpose, opens a CT or TWA to the same tracking domain. This domain sets a unique identifier in a cookie, stored in the browser’s shared cookie jar. When another app using the same library loads content from the same domain, the cookie is sent, enabling the tracker to correlate activity across apps—and even into regular browser use. Due to Android’s backup mechanisms, the tracking ID can be restored even after a factory reset, rendering it more persistent than traditional evercookies

Cite here or directly after name?

This thesis explores whether Capabilities, a fine-grained access control model, can be used to limit or prevent these privacy issues without breaking legitimate use cases of CTs and TWAs. Specifically, we aim to design and evaluate a framework that allows developers

to retain the benefits of third-party libraries—such as SSO or monetization—without exposing users to invisible, cross-app tracking. The framework should be simple to integrate, practical in real-world deployments, and minimize interference with established app workflows.

Chapter 2

Related Work

Write the related work (hytrack)

Citation to Hytrack[1]

Chapter 3

Methodology

Write the methodology.

Chapter 4

Evaluation

Write the evaluation.

Chapter 5

Schedule

Write the schedule.

Chapter 6

Success Criteria

Write the success criteria.

Bibliography

- [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)*. Seattle, WA: USENIX Association, Aug. 2025.

Additional Something

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Notes

■ What is the dedication page?	v
■ Write the abstract.	vii
■ Write the introduction.	1
■ Cite here or directly after name?	1
■ Write the related work (hytrack)	3
■ Write the methodology.	5
■ Write the evaluation.	7
■ Write the schedule.	9
■ Write the success criteria.	11