Prof. Dr. Jan Krämer

**Lehrstuhl für Wirtschaftsinformatik
mit Schwerpunkt Internet- und
Telekommunikationswirtschaft**

UNIVERSITÄT PASSAU
Wirtschaftswissenschaftliche Fakultät

An Overview of Online Tracking Techniques [Working Title]

Supervisor: Alexander Witte <alexander.witte@uni-passau.de>
Date: As of now
Type: Bachelor's Thesis, Master's Thesis
Language: German or English

Motivation:

Digital advertising is what funds free online content. Central to digital advertising is the ability to identify and track users. As tracking users to collect data across several devices and web premises enables firms to personalize ads and measure ad campaign outcomes (e.g., conversions), it has become ubiquitous over the past decades. At the same time, the extent of tracking today has made consumers wary of "surveillance capitalism" and elicits privacy concerns. Due to such privacy concerns, political entities have launched various legislative packages in recent years, such as the General Data Protection Regulation (GDPR) or the California Consumer Privacy Act (CCPA), to better protect consumer privacy in the increasingly digitalized world. Moreover, even large tech companies like Google, which announced to stop supporting tracking cookies in its market-leading browser Chrome by 2023, or Apple, which limits tracking on iOS devices through its "App Tracking Transparency" update (since iOS version 14.5), have started to take measures against the extent of user tracking.

Although the term "tracking" often evokes a negative feeling of an external and possibly unwanted observer, few consumers know how tracking even works. Especially when it comes to technical details, many consumers lack the necessary "know-how" to make informed decisions to proactively limit tracking if they wish to do so. At the same time, publishers of websites or apps implement ready-made services from tracking providers such as Google Analytics or mobile SDKs such as Google Firebase to collect user data and monetize it by selling advertising. While these tools simply offer "plug-&-play" solutions, a better technical understanding of how they work could enable publishers to make more informed decisions about which provider to choose or any alternatives.

Goal:

The goal of this thesis is to provide an overview of the technical foundations of online tracking techniques that are currently used in the advertising industry. Moreover, the thesis should entail a specific case study of a tracking service, e.g., Google Analytics, in which the author describes the functioning of the specific service in detail. In general, the following non-exhaustive list of questions provide a preliminary, yet fruitful starting point for investigation:

- What is the role of tracking in the online advertising industry? How can users be tracked online? What is the extent of tracking online?
- How does tracking work from a technical perspective? Which tracking methods exist and on which kind of device (mobile, desktop, CTV, smarthome devices …) are they deployed and in which fashion? How can consumer profiles be created using data points from different devices?
- How do consumers and/or firms limit the extent of tracking? How does the limitation work from a technical perspective? What is the motivation behind these deliberately deployed limits?

- What are possible effects of limiting the extent of tracking online? Given that advertising funds free online content, is there a tradeoff involved in limiting the extent of tracking for the sake of online privacy?

Preliminary Literature:

- Bujlow, T., Carela-Español, V., Sole-Pareta, J., & Barlet-Ros, P. (2017). A survey on web tracking: Mechanisms, implications, and defenses. *Proceedings of the IEEE*, *105*(8), 1476-1510.

- CMA. (2020). Online platforms and digital advertising market study. Appendix G: the role of tracking in digital advertising. Retrieved from https://www.gov.uk/cma-cases/online-platforms-and-digital-advertising-market-study

- Englehardt, S., & Narayanan, A. (2016, October). Online tracking: A 1-million-site measurement and analysis. In *Proceedings of the 2016 ACM SIGSAC conference on computer and communications security* (pp. 1388-1401).

- Mozilla Developer Network. *Using HTTP cookies*. https://developer.mozilla.org/en-US/docs/Web/HTTP/Cookies
å
- Ravichandran, D., & Korula, N. (2019). Effect of disabling third-party cookies on publisher revenue. *Google Inc.* https://services.google.com/fh/files/misc/disabling_third-party_cookies_publisher_revenue.pdf