Hochschule
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University of Applied Sciences

# A Privacy Measure Turned Upside Down?

## Investigating the Use of HTTP Client Hints on the Web

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H-BRS University of Applied Sciences, Germany

swiefling.de & H-BRS University of Applied Sciences, Germany (*)

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July 30 - August 02, 2024

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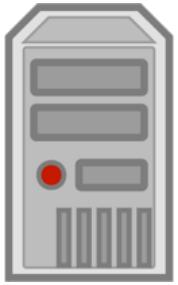
# User Agent String



Nielsen et al. 1996. Hypertext Transfer Protocol – HTTP/1.0

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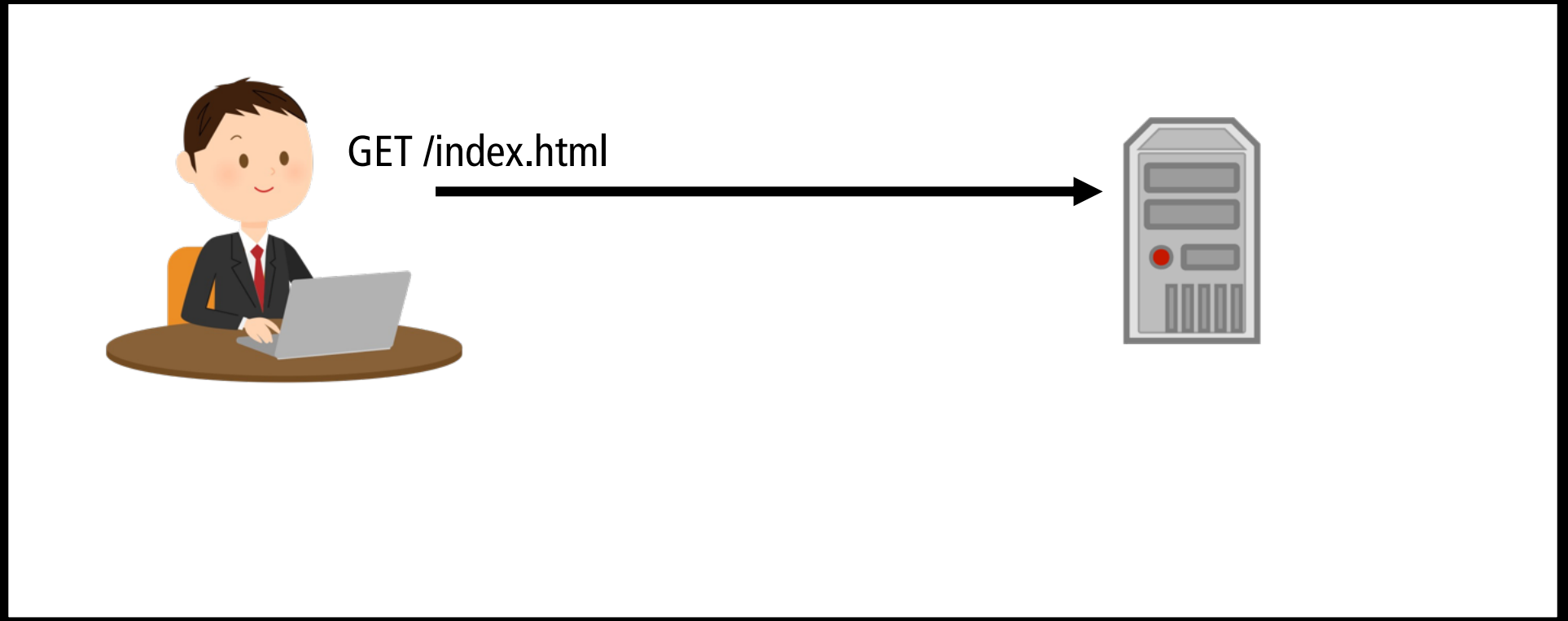


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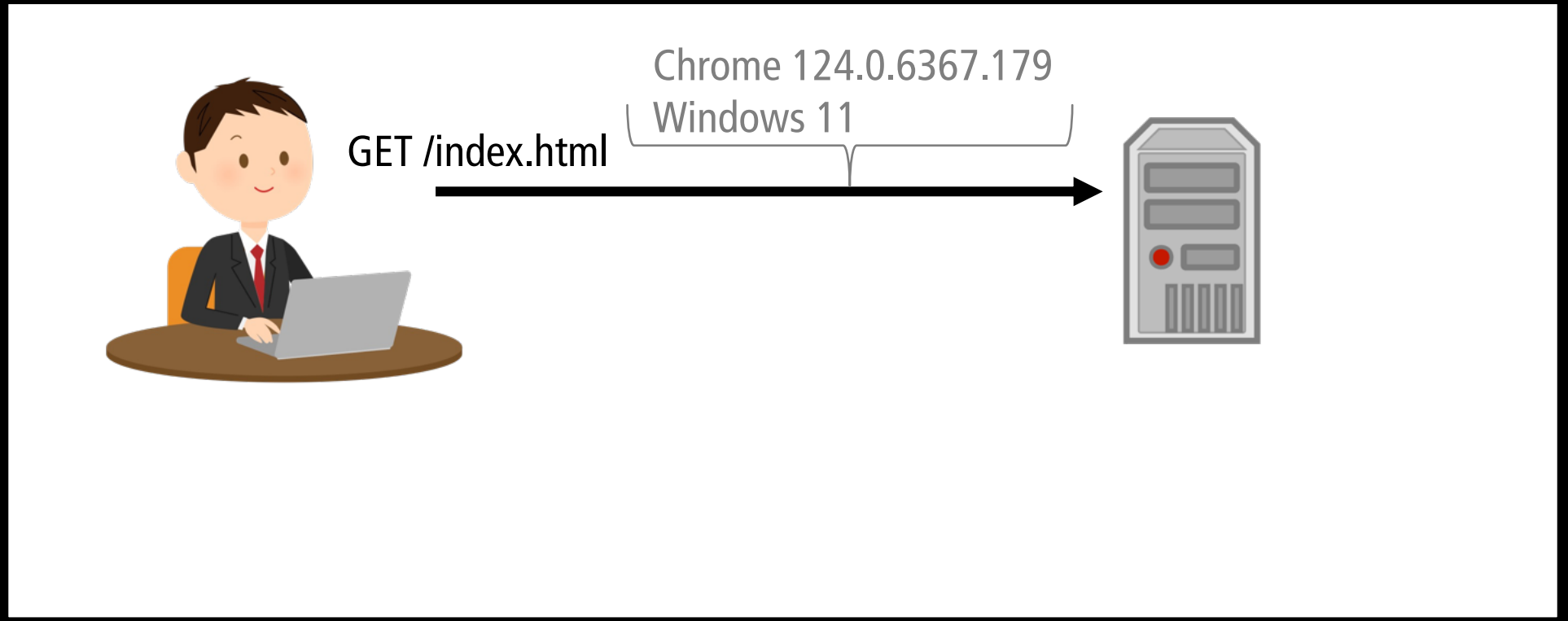


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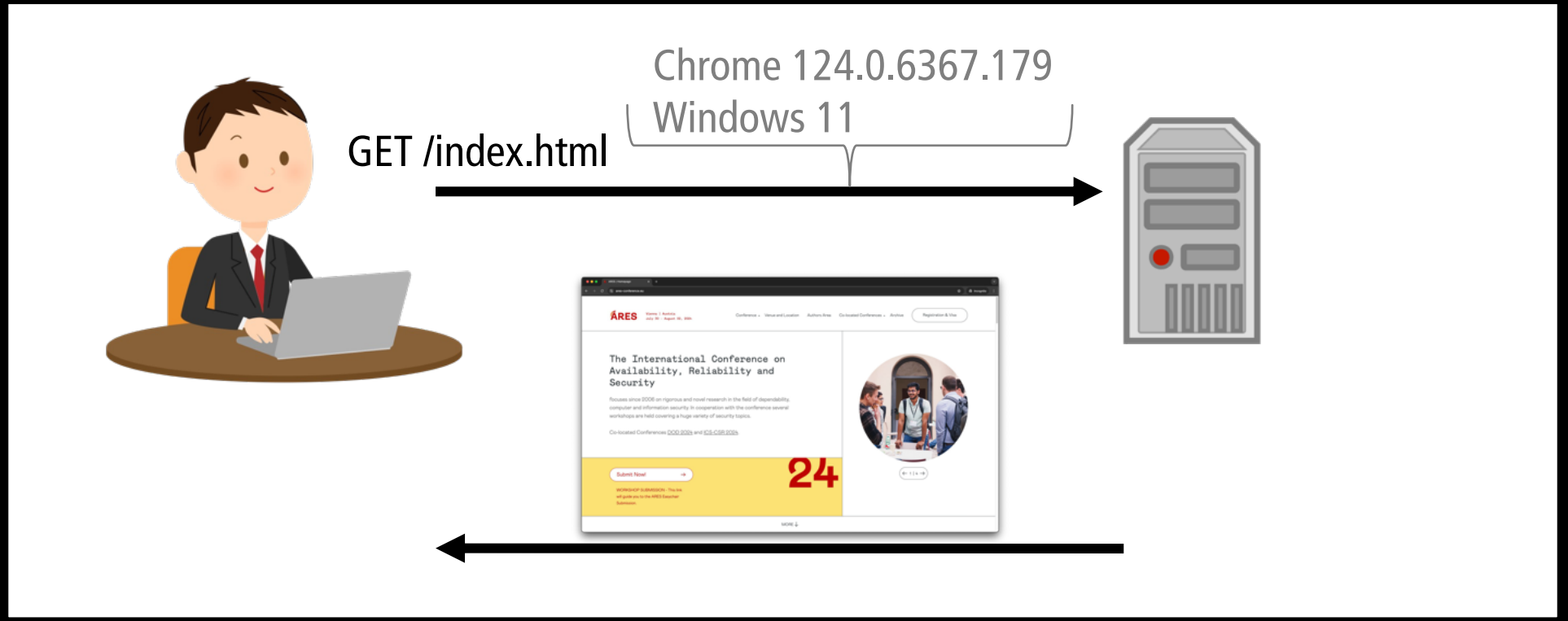


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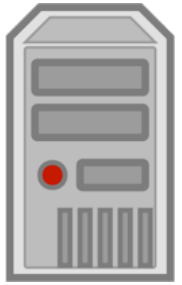
# HTTP Client Hints (HTTP CHs)



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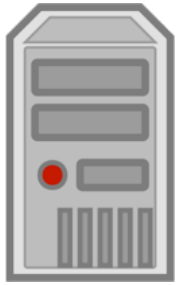

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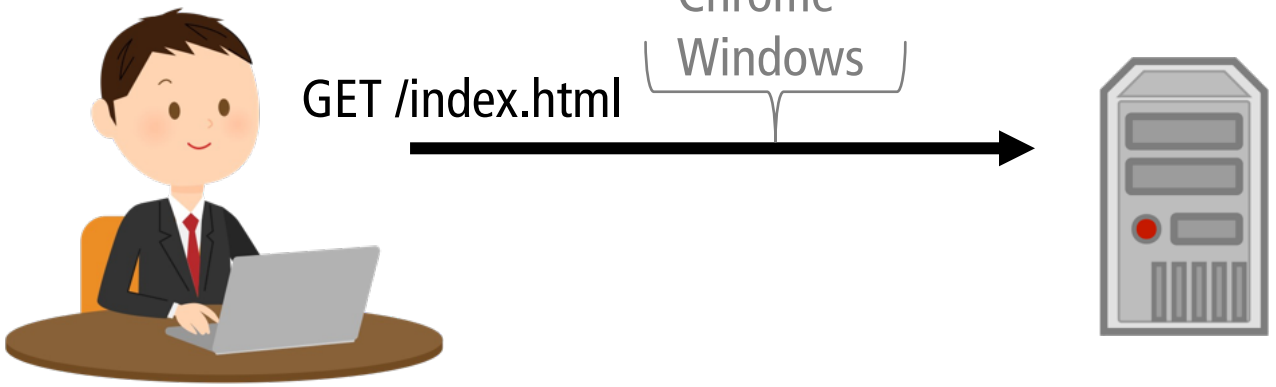


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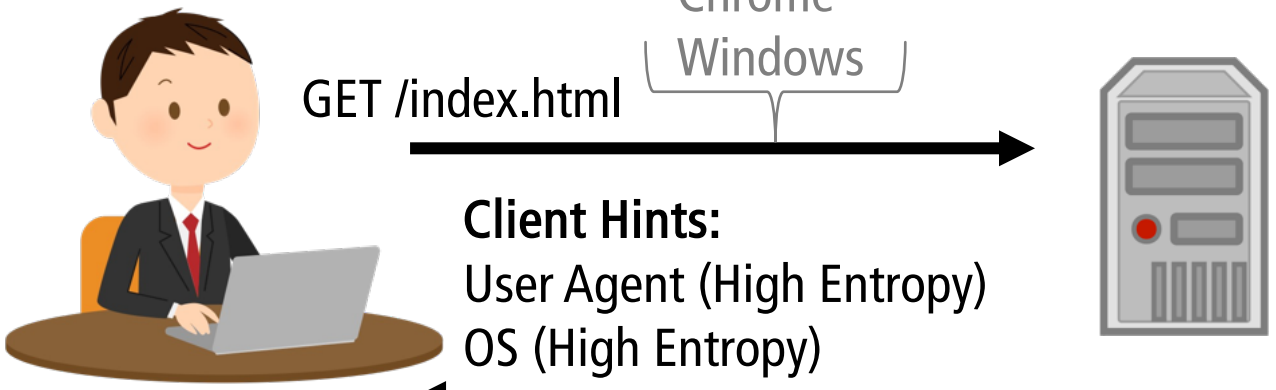


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# HTTP Client Hints (HTTP CHs)

Chrome
Windows

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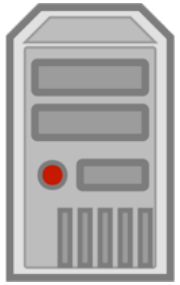

**Client Hints:**
User Agent (High Entropy)
OS (High Entropy)

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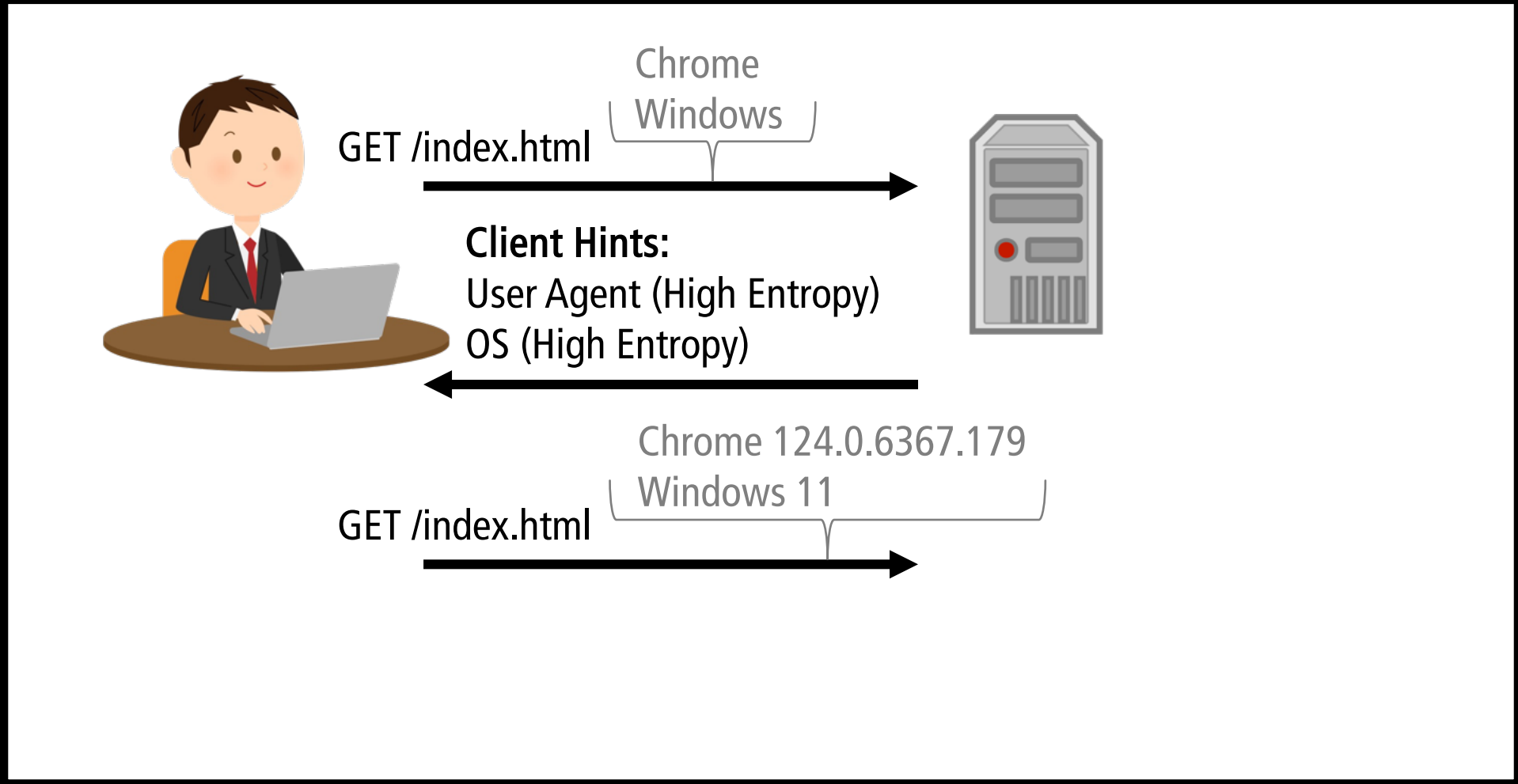


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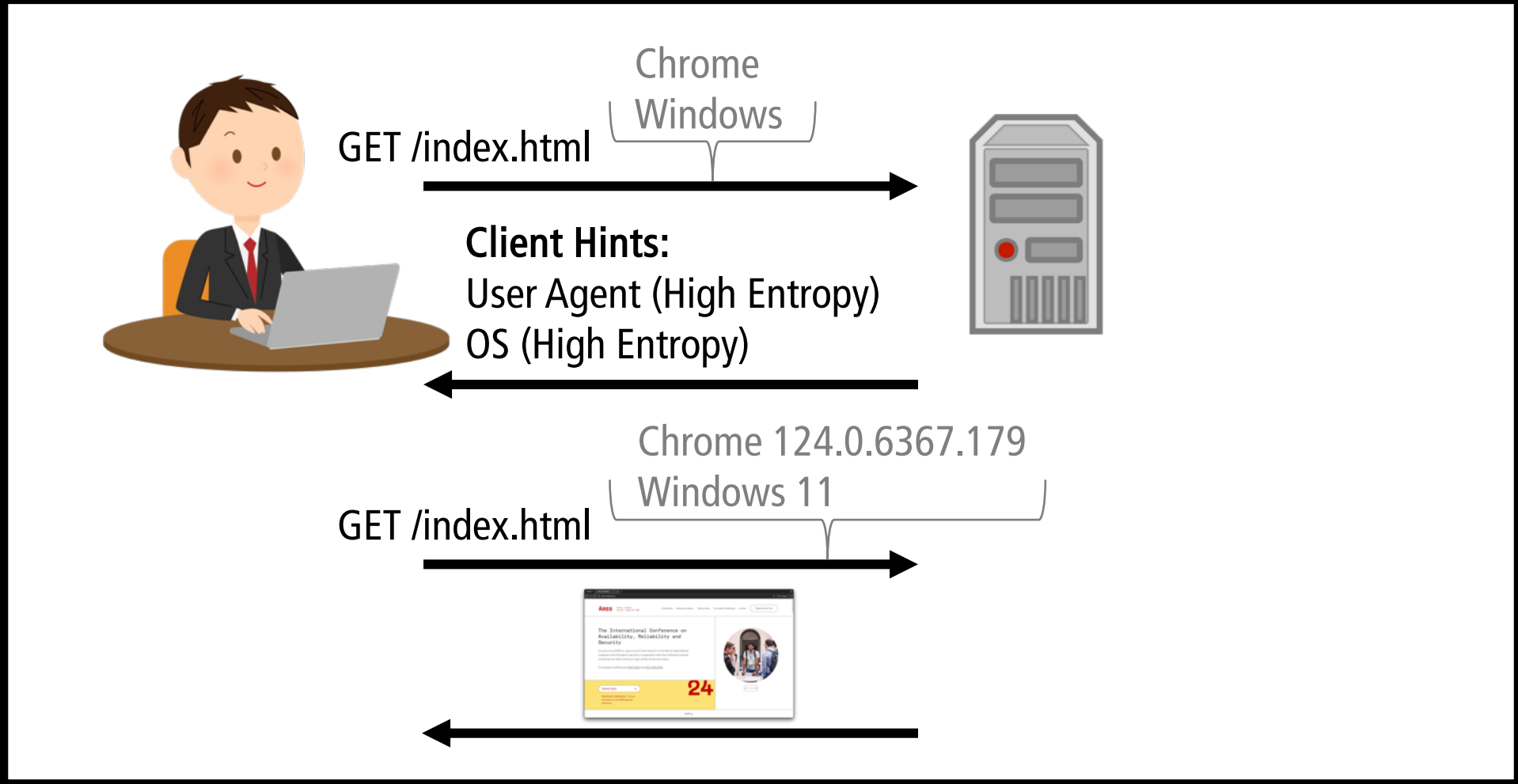


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| User Agent | Level of Detail |
| --- | --- |
| User Agent (High Entropy) | High |
| User Agent Brand List | |
| OS (High Entropy) | |
| Device Model | Medium |
| OS (Low Entropy) | |
| User Agent (Low Entropy) | |
| CPU Bitness | |
| Device Form Factor | |
| Is Windows64 | |
| Platform Architecture | |
| Prefers Mobile UX | Low |

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## User Preference Media

Contrast Preference
Forced Colors
Light/Dark Mode
Prefers Reduced Motion
Reduced Transparency

## Level of Detail

Low

| Device Information | Level of Detail |
| --- | --- |
| Viewport Width | High |
| Width | |
| Client Device Pixel Ratio | |
| Client's RAM | |
| Image Device Pixel Ratio | Low |

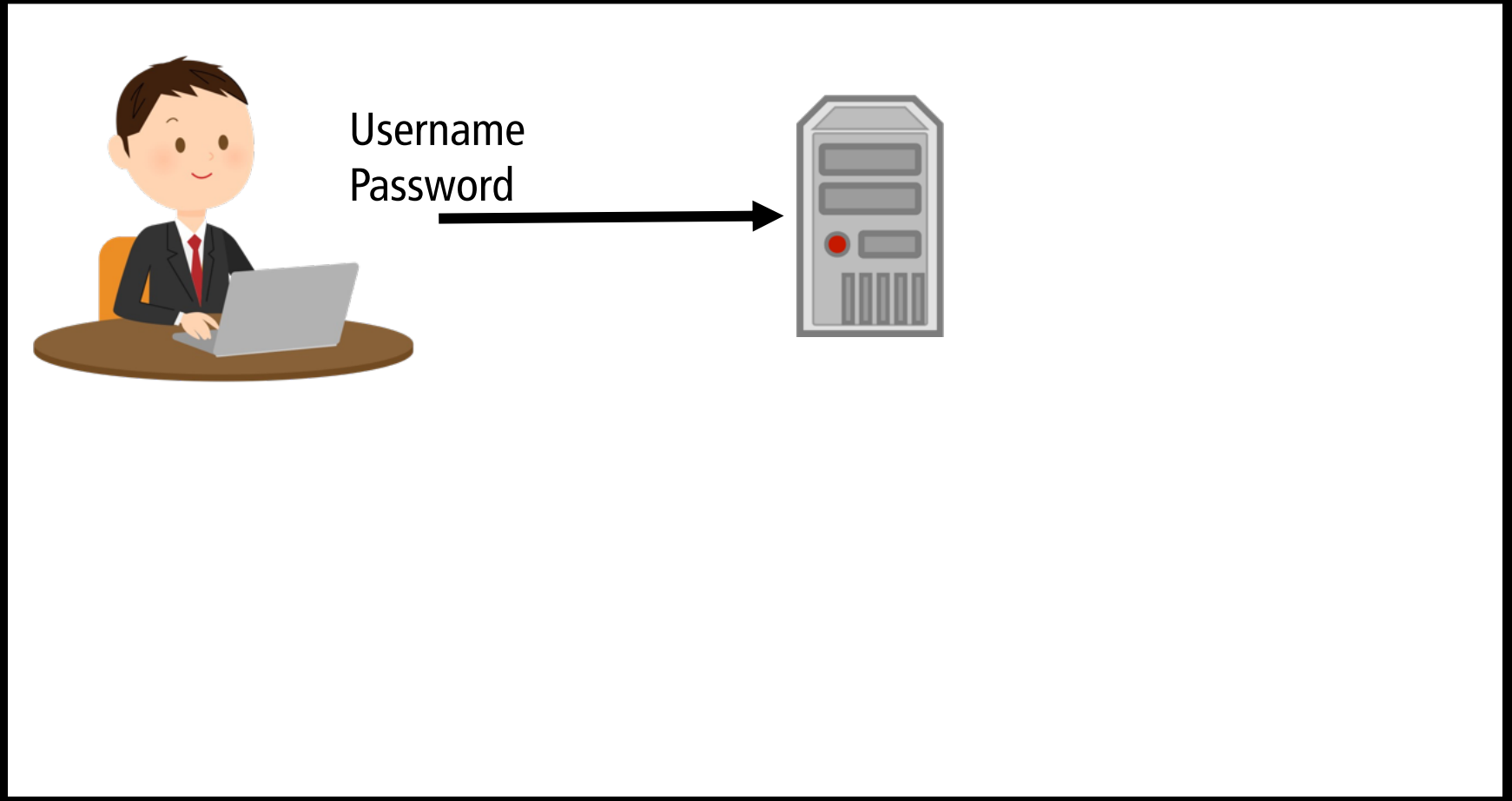
| Network | Level of Detail |
| --- | --- |
| Bandwidth | High |
| Network Profile | |
| Round-Trip Time | |
| Prefers Reduced Data | Low |

# Affects 78% desktop and 69% mobile users*

* Statscounter. 2024. Browser Market Share Worldwide.

# Some Websites Depend on Browser Information

# Risk-Based Authentication (RBA)

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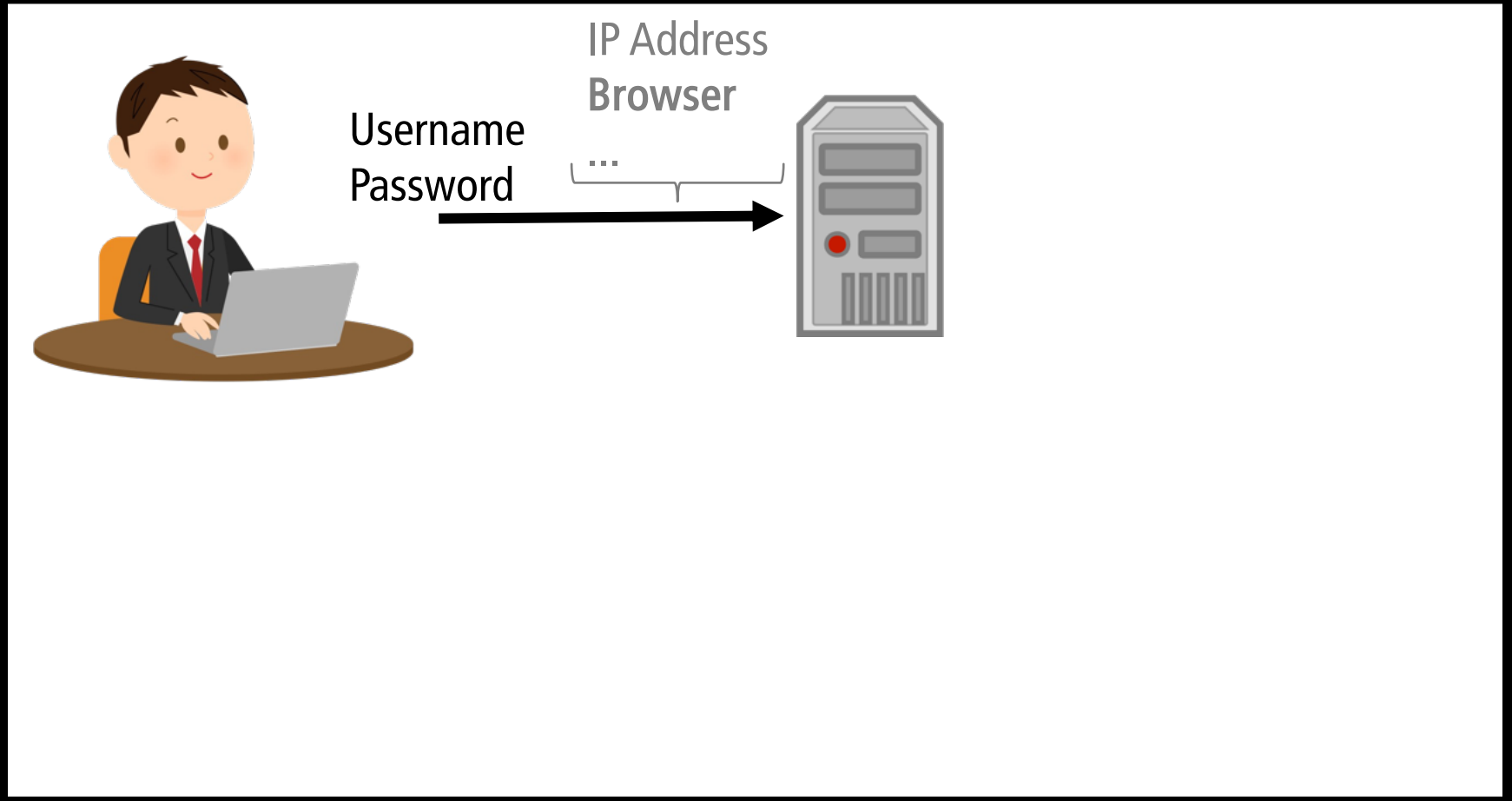

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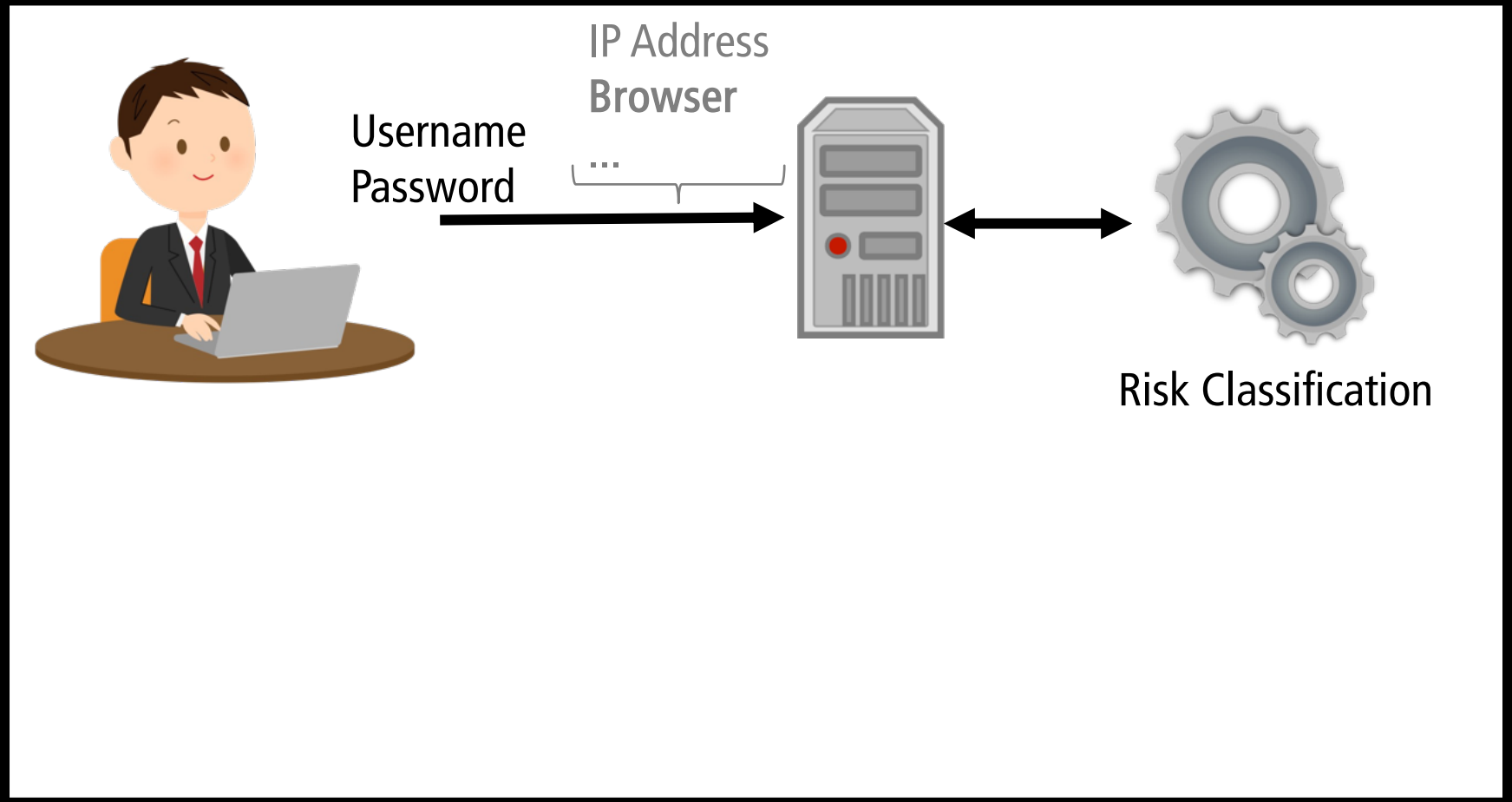


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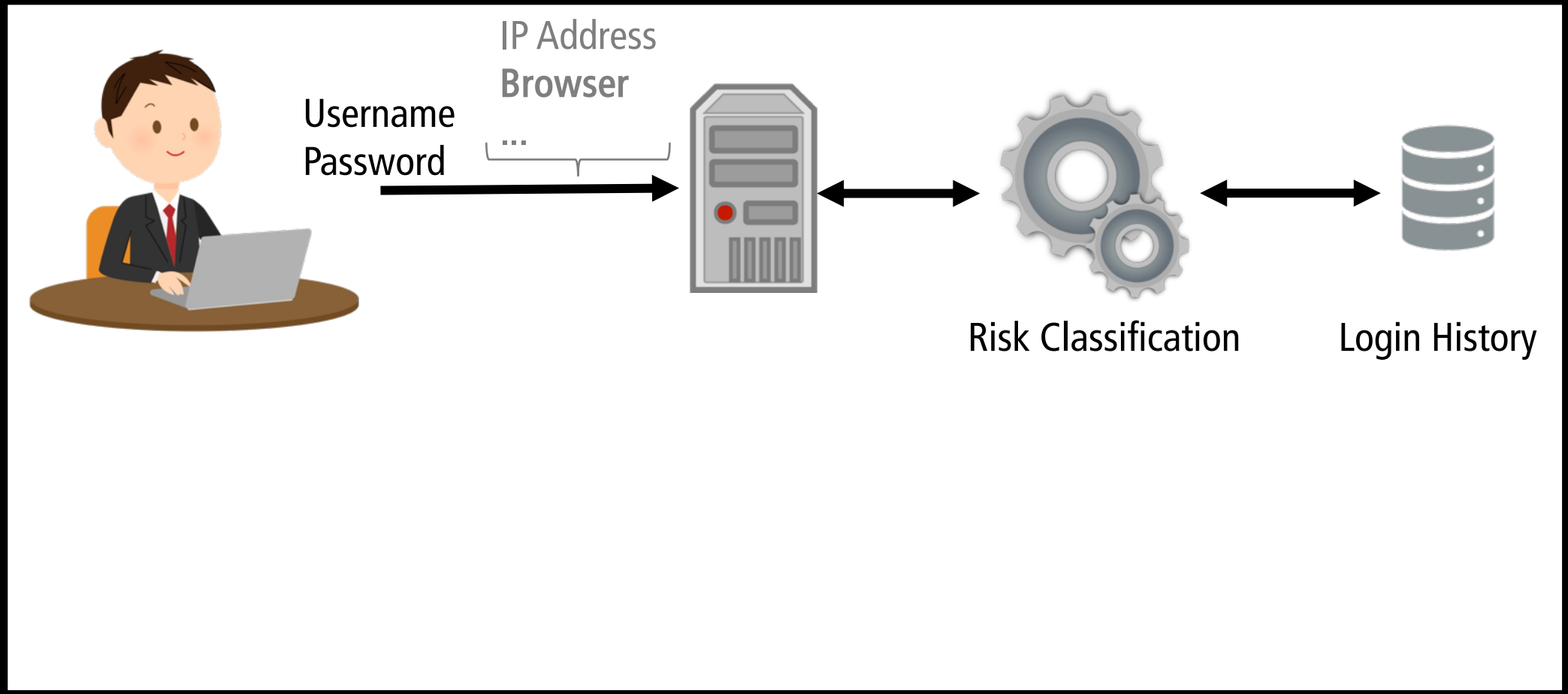

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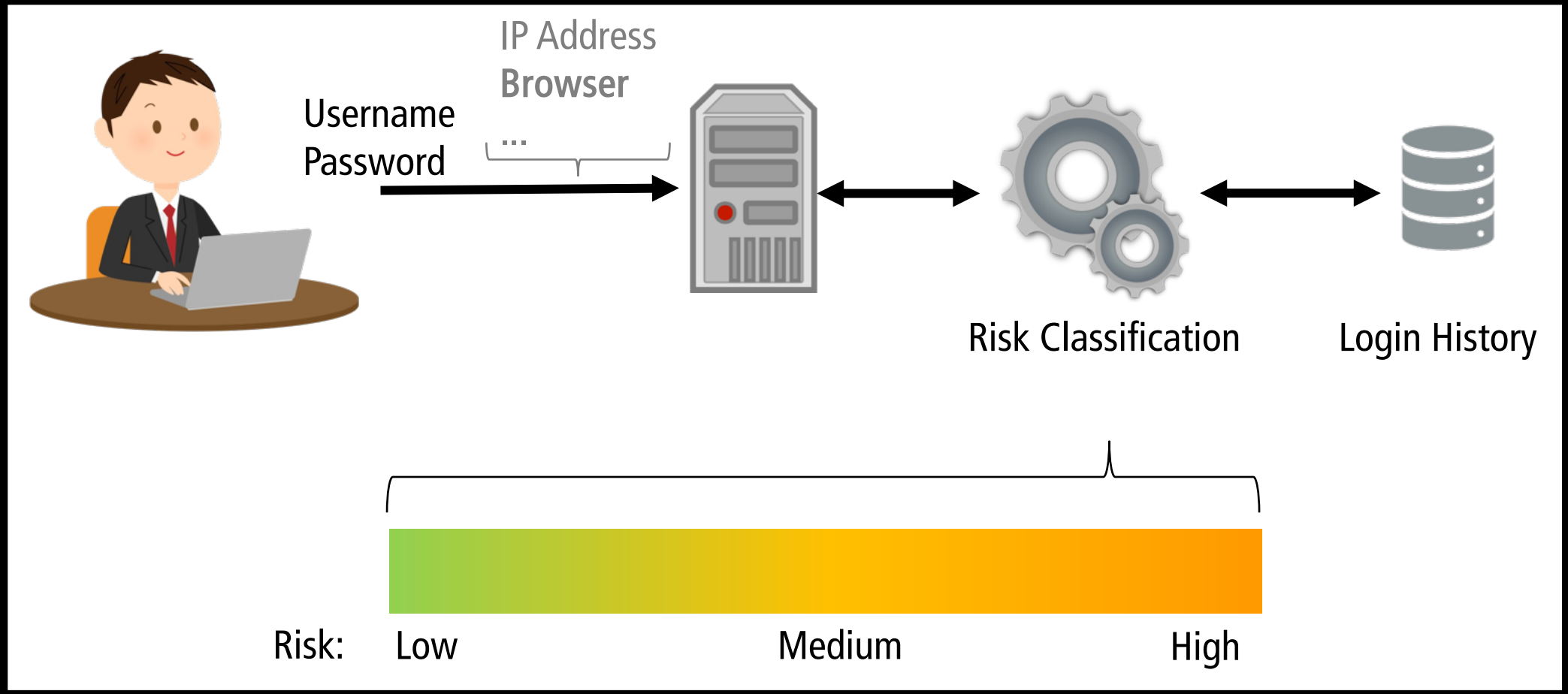


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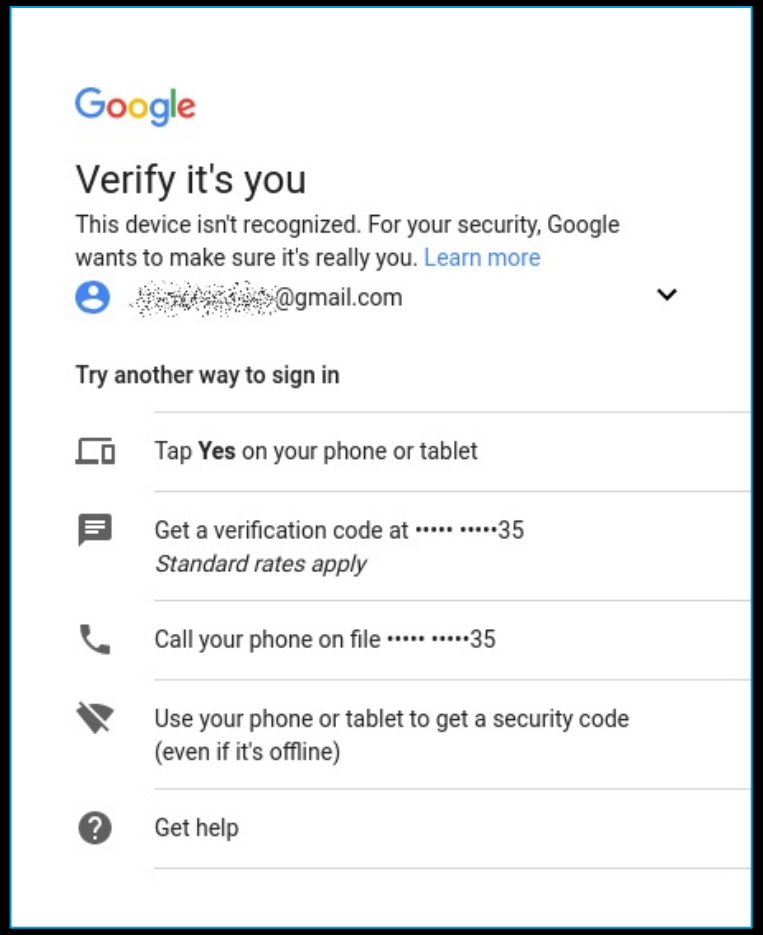
# Risk-Based Authentication




Wiefling et al.: Is This Really You? An Empirical Study on Risk-Based Authentication Applied in the Wild. In: IFIP SEC (2019). Springer

# User Tracking

# How do Websites use HTTP CHs in Practice?

# Overview


Study


Results


Conclusion

# Overview



# Two Data Sources

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- Website Start Pages (~12M Websites*)

*12M websites from on Chrome UX Report

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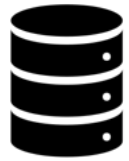

Login Pages

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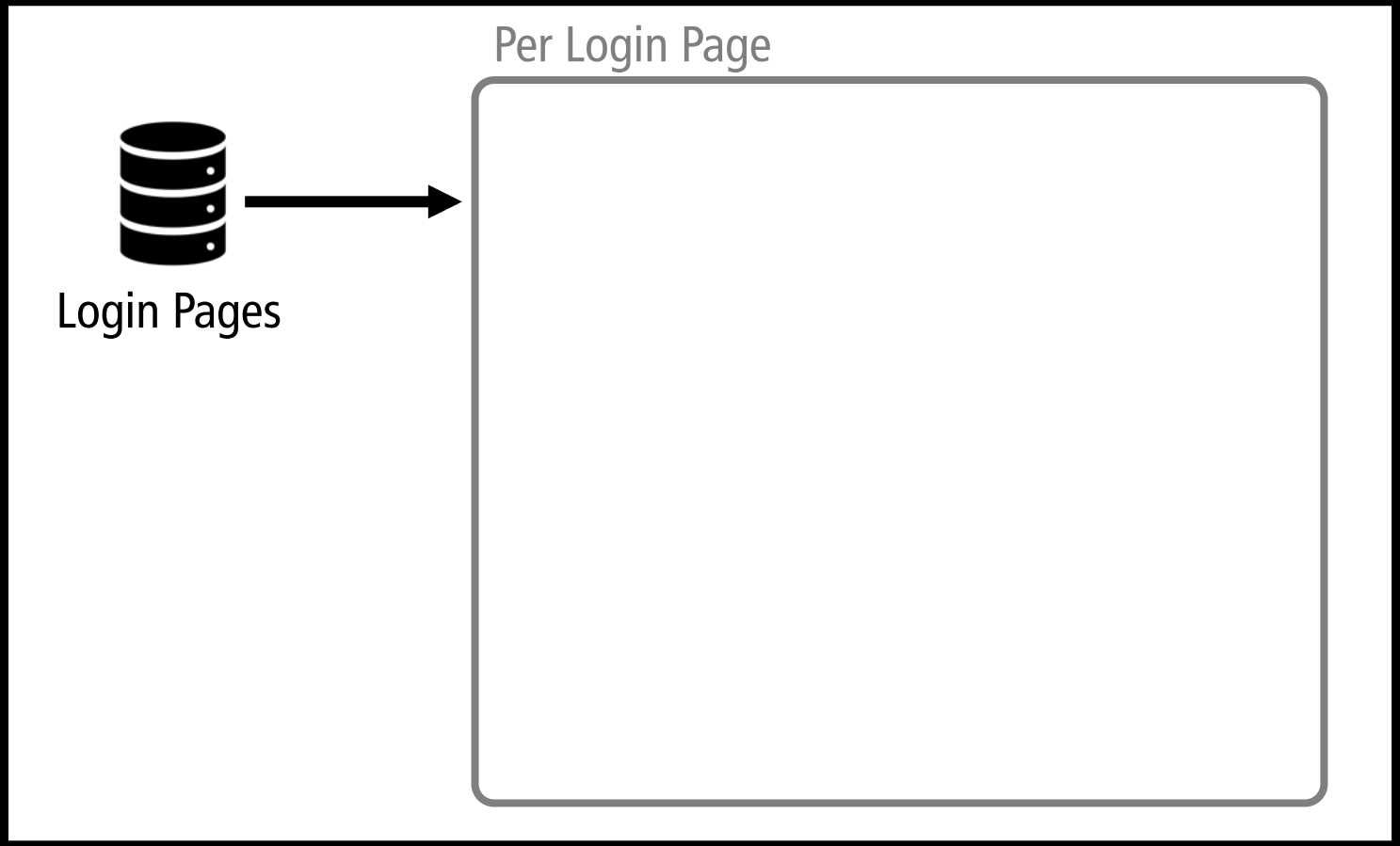

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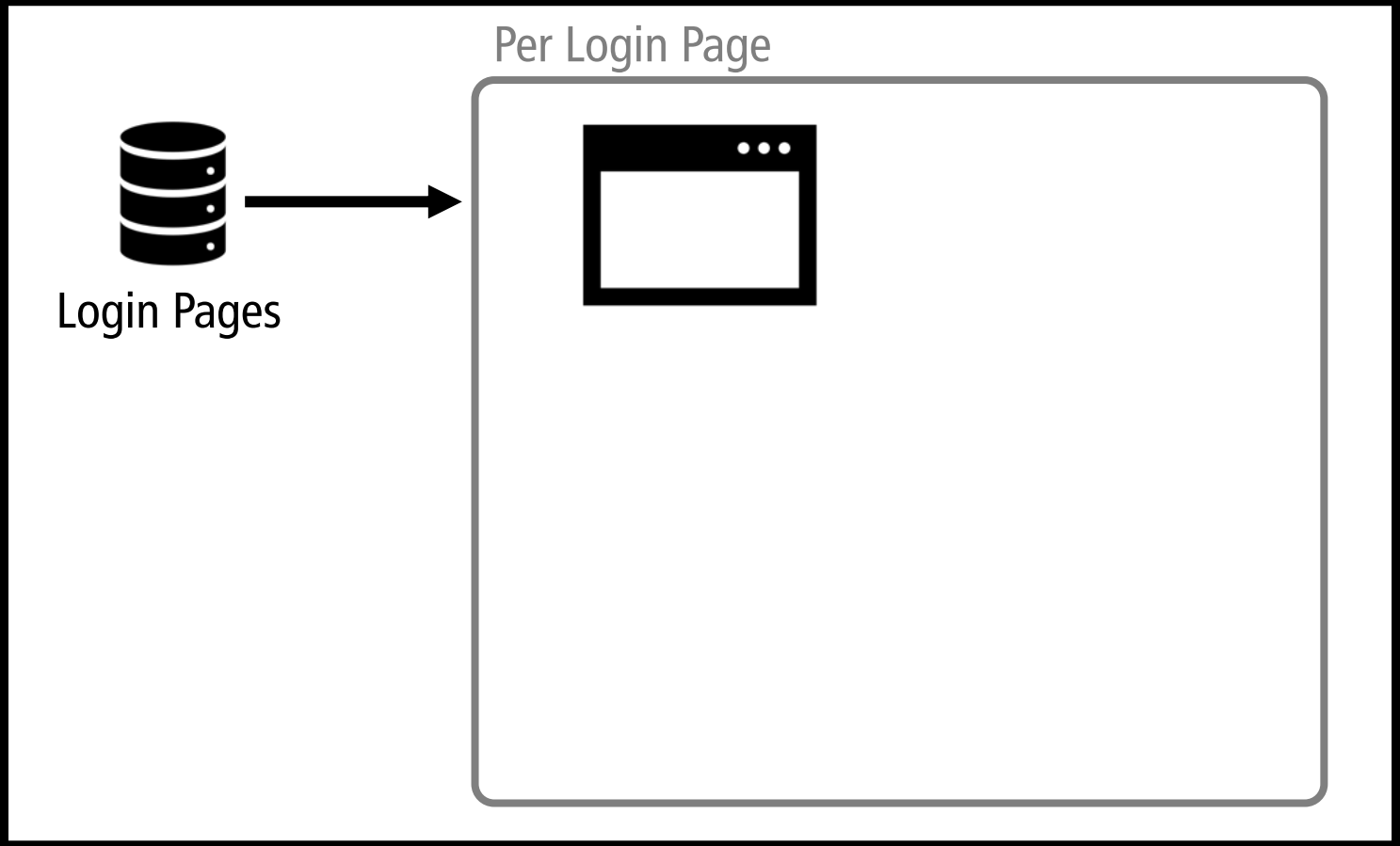

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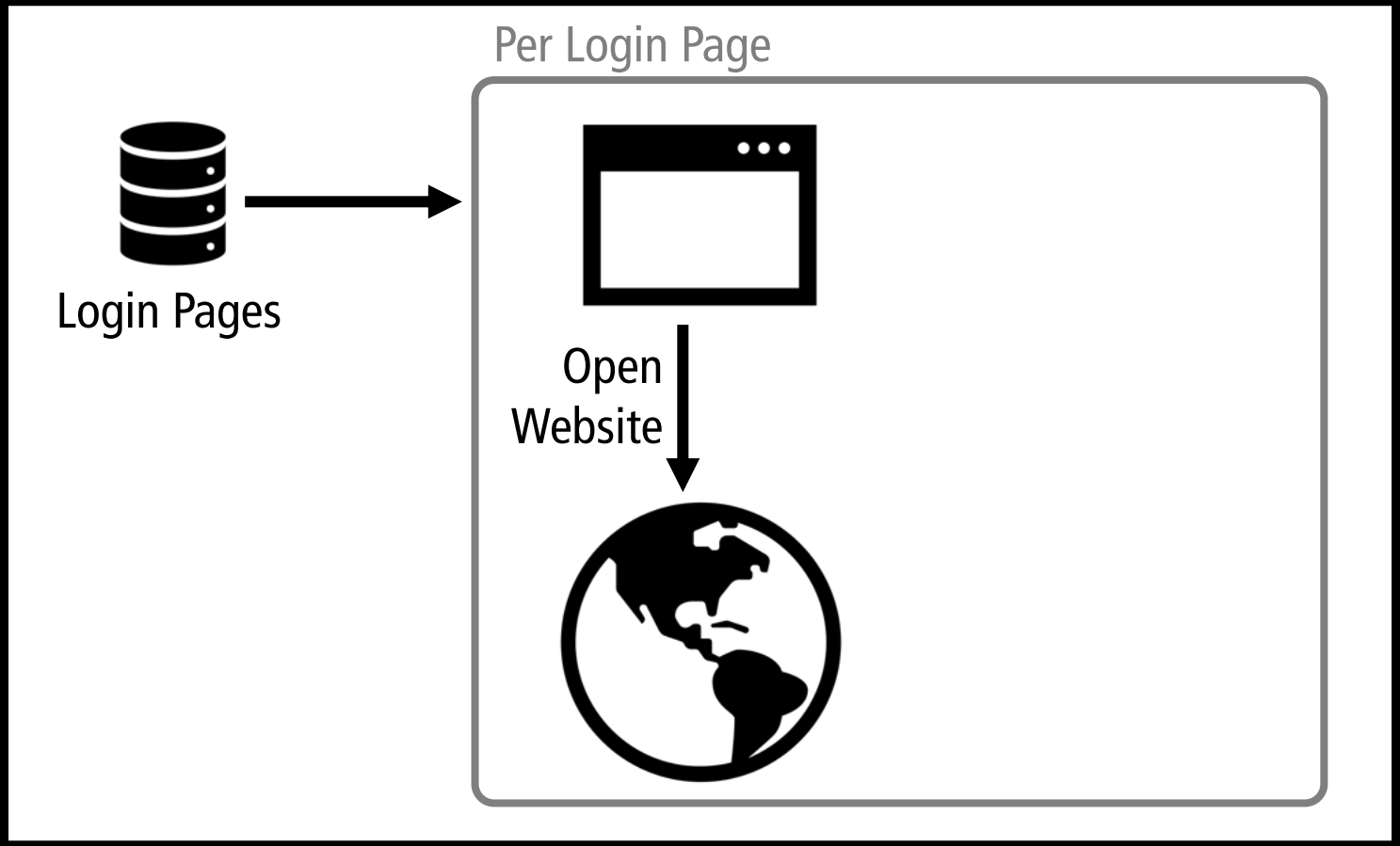

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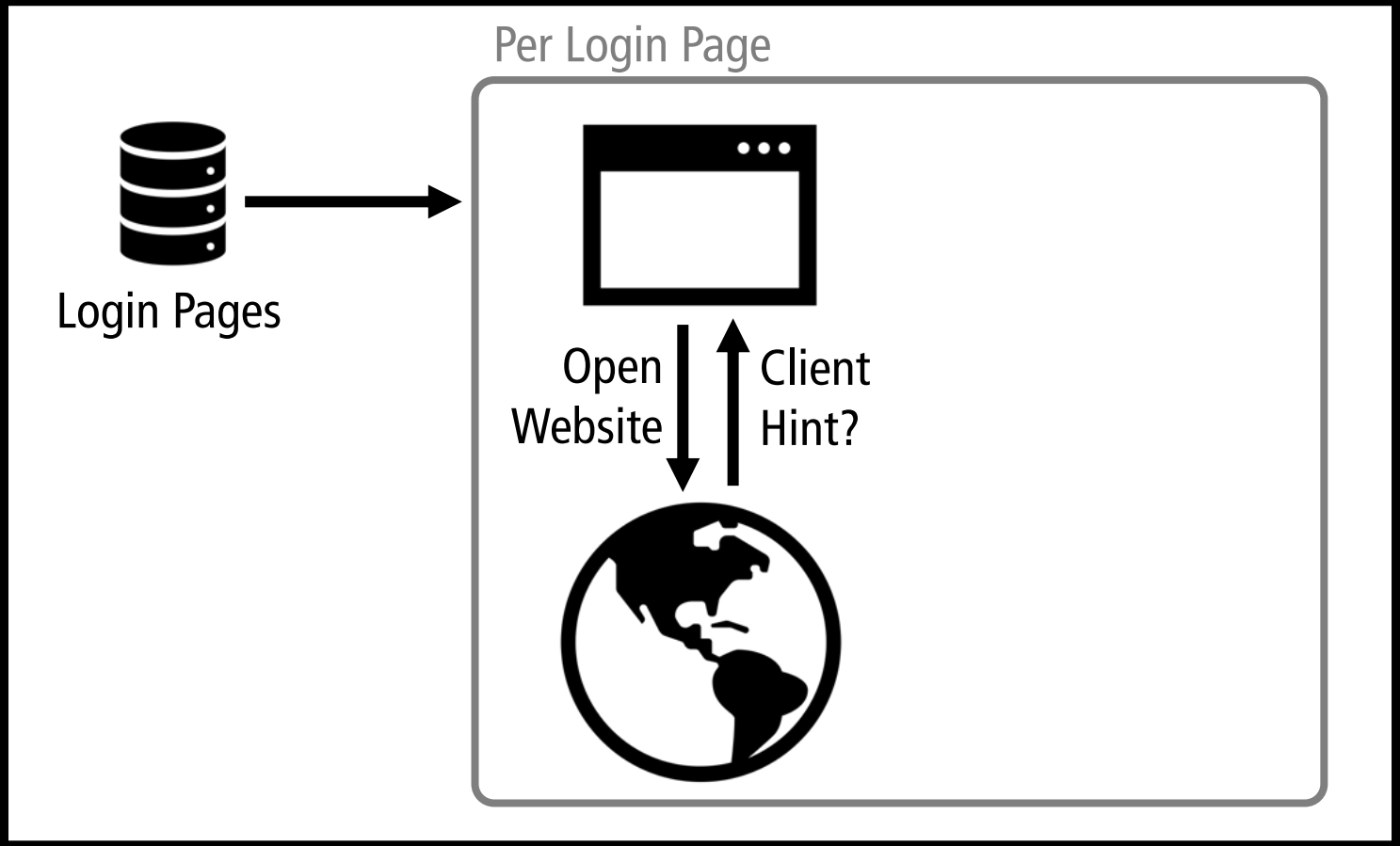

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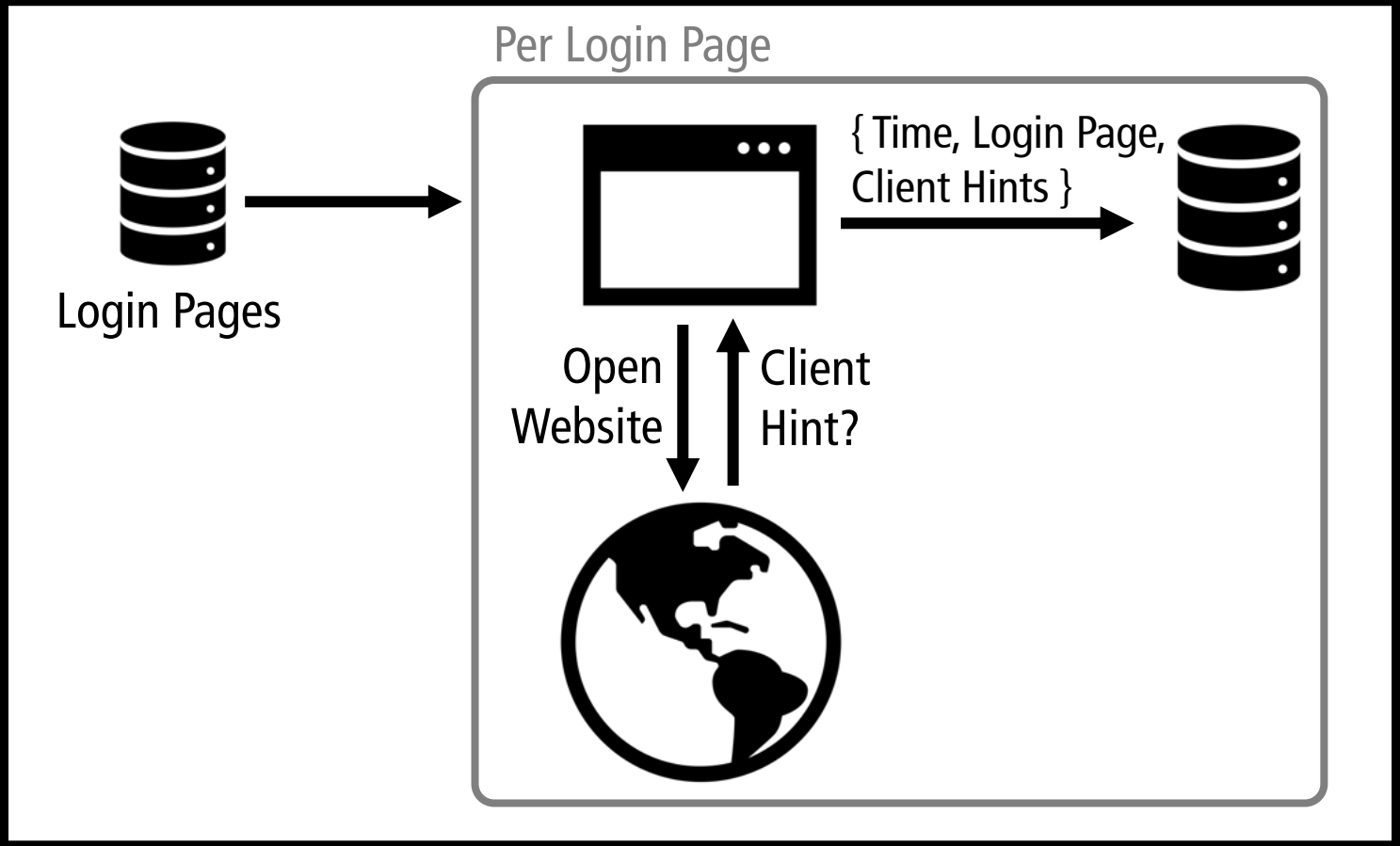

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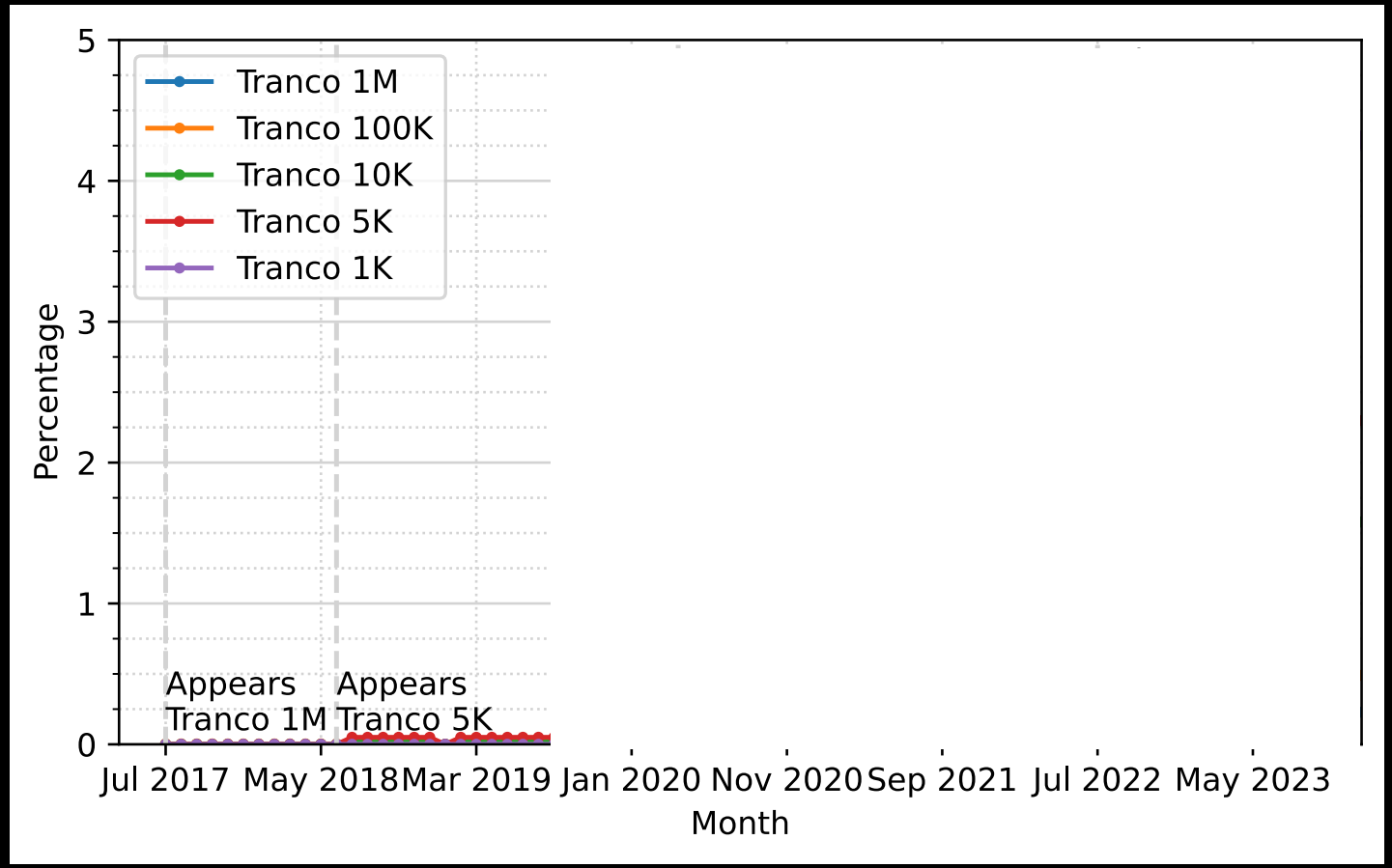

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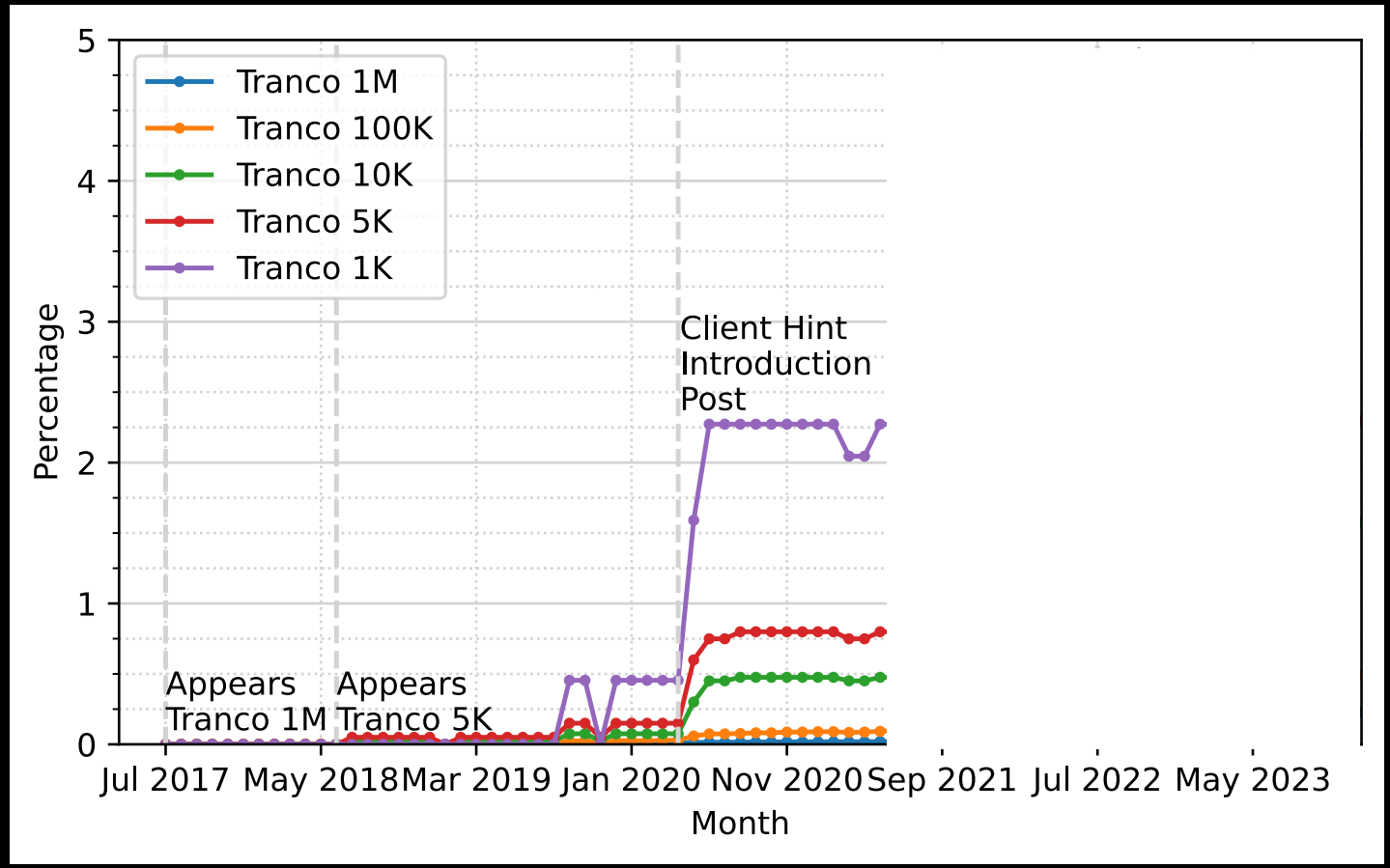

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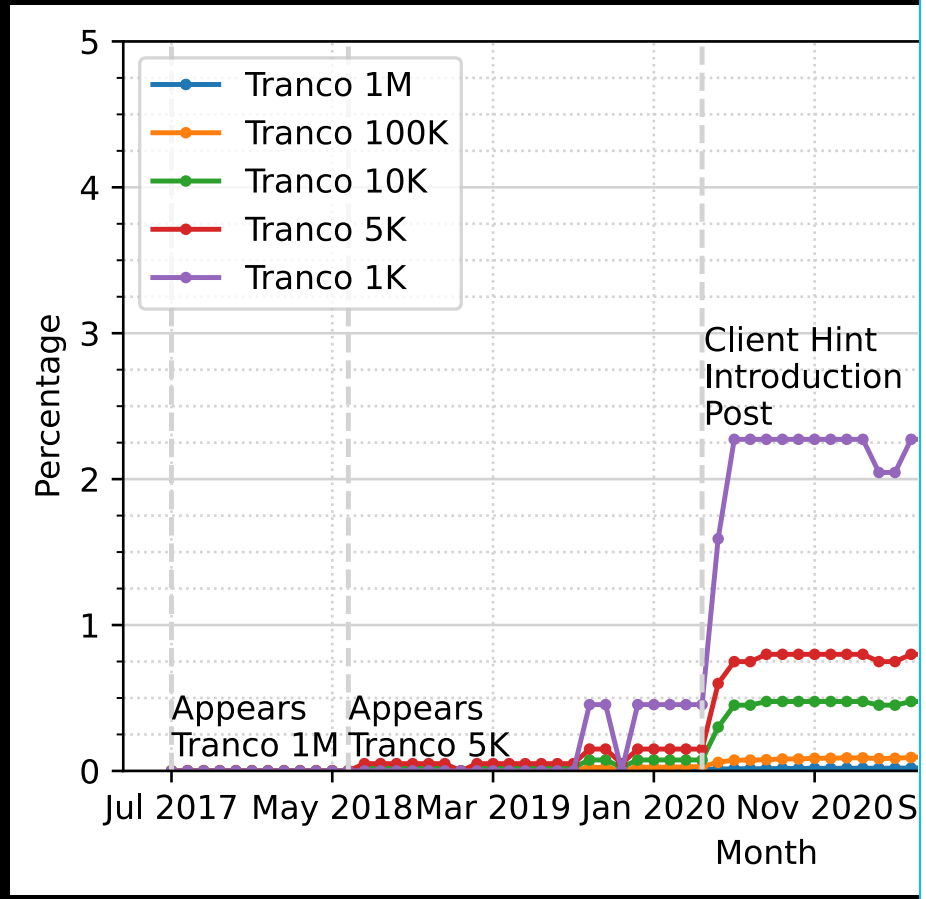


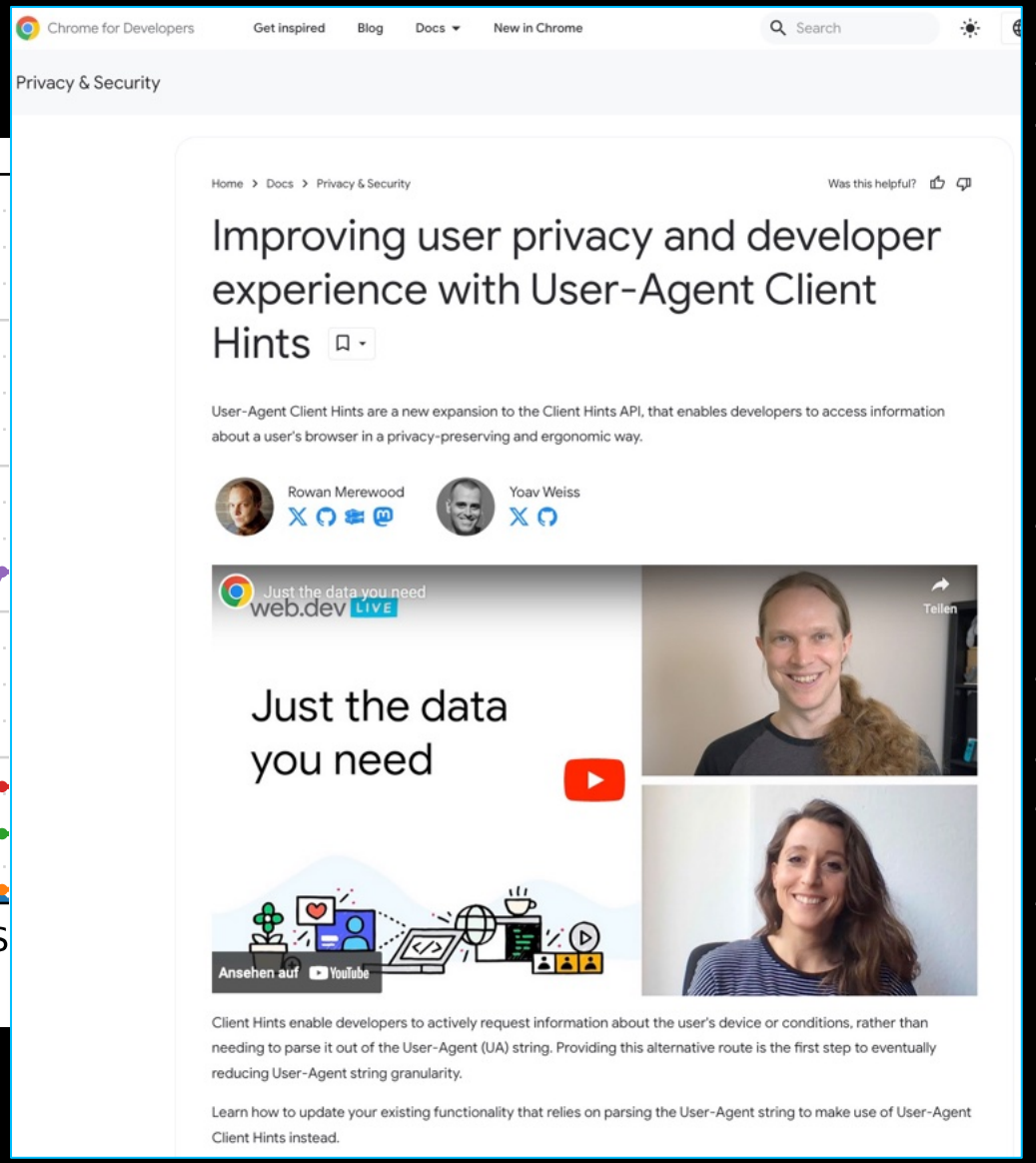


https://developer.chrome.com/docs/privacy-security/user-agent-client-hints

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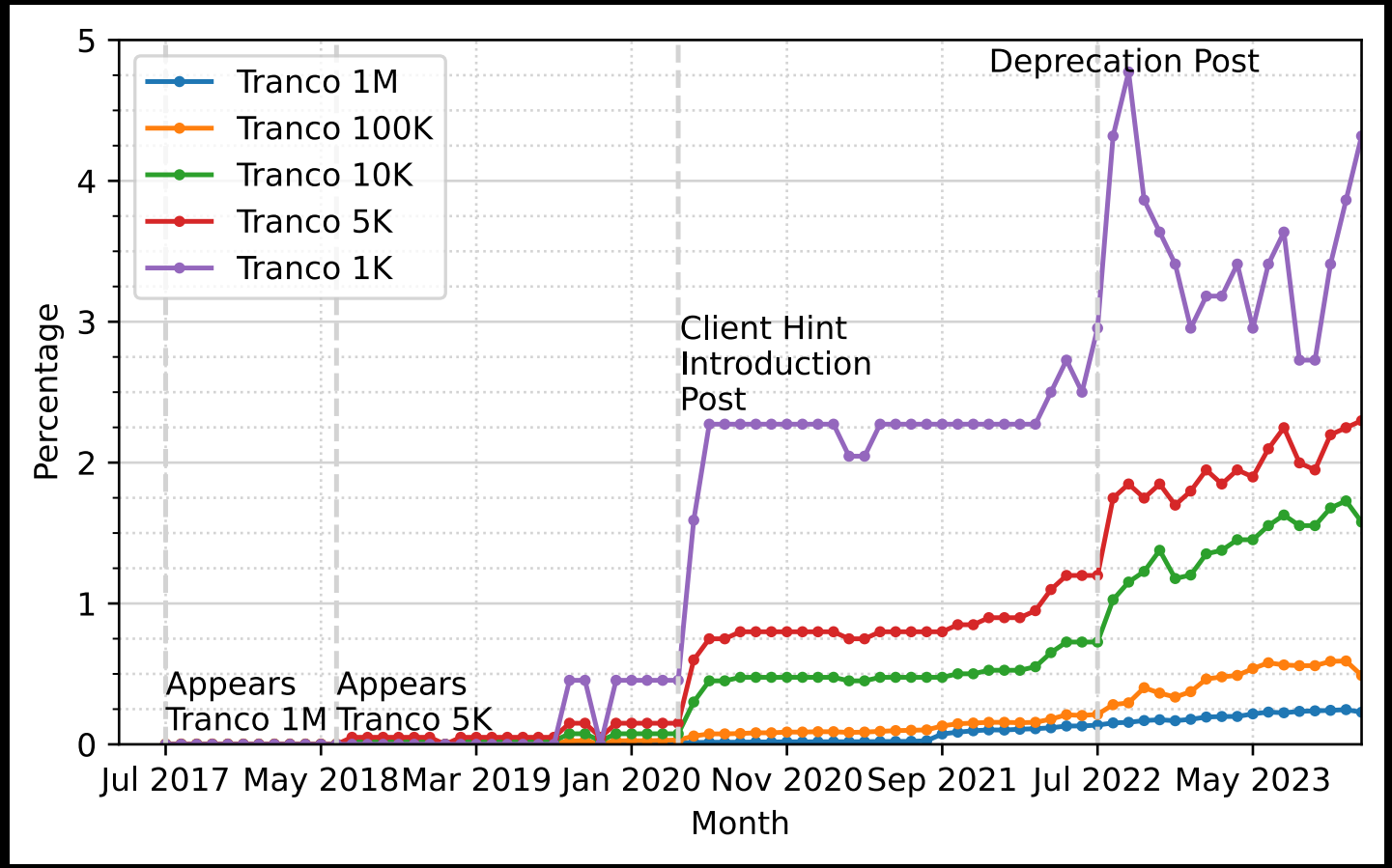

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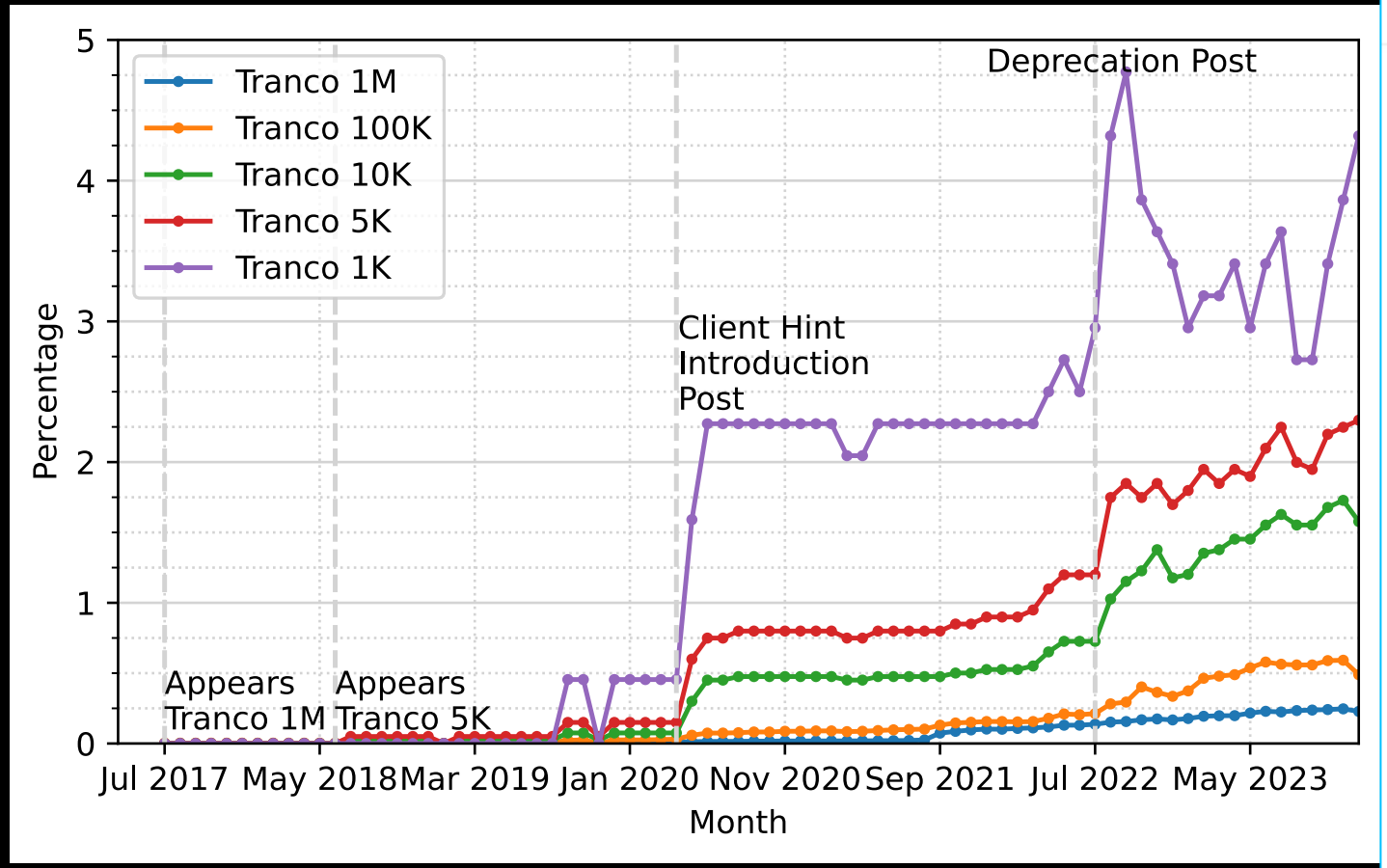


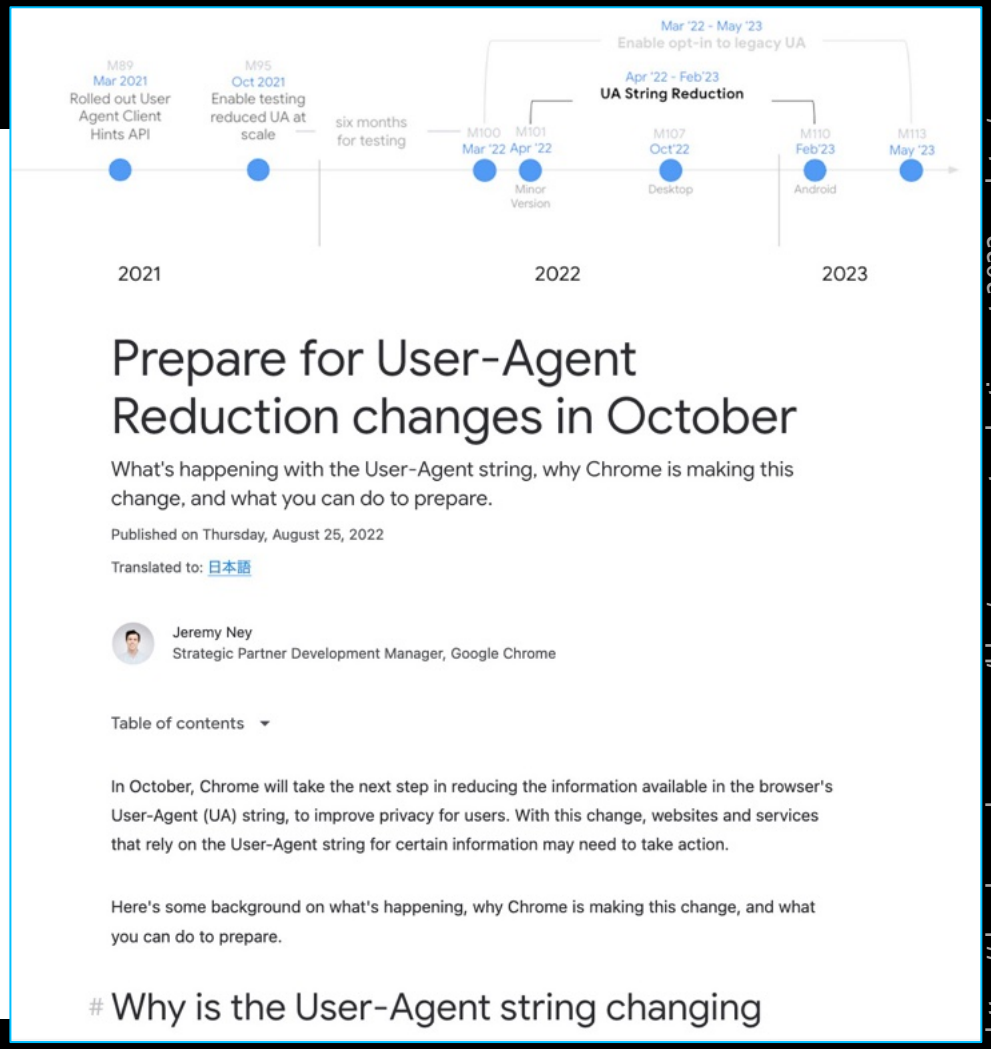


https://developer.chrome.com/blog/user-agent-reduction-oct-2022-updates/

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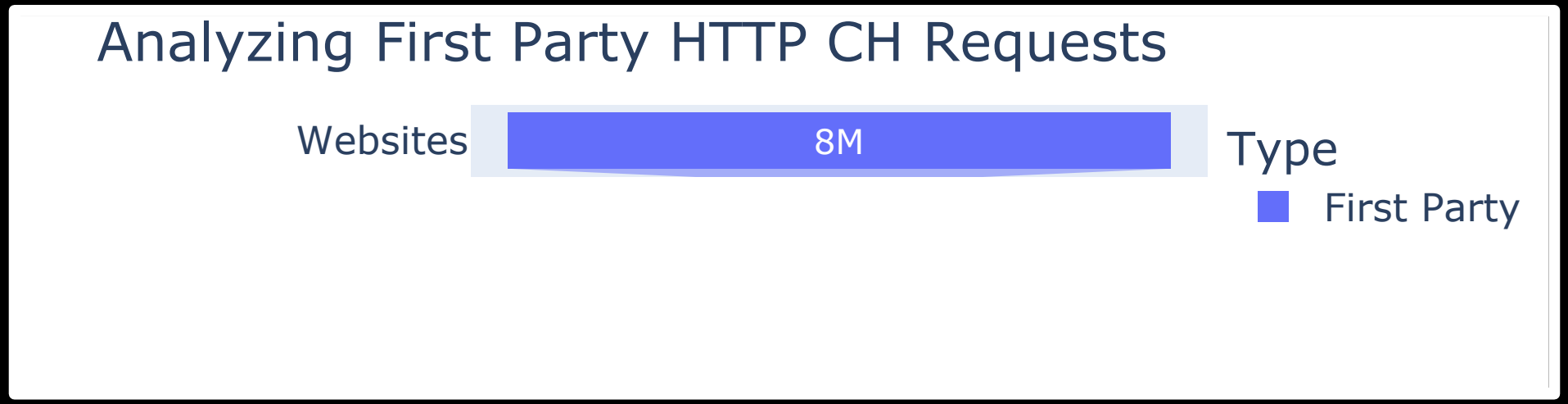

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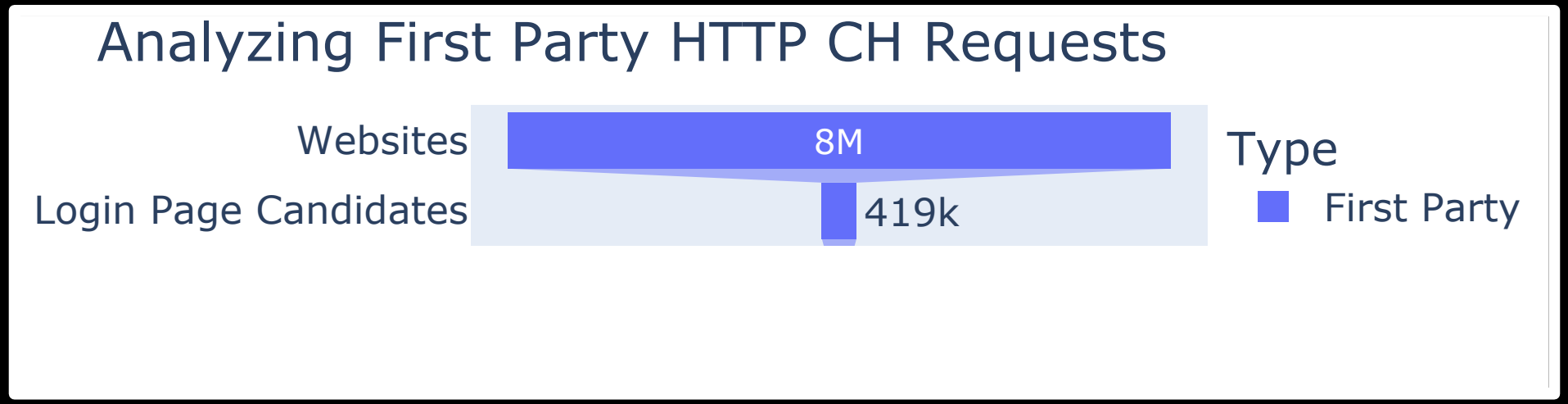

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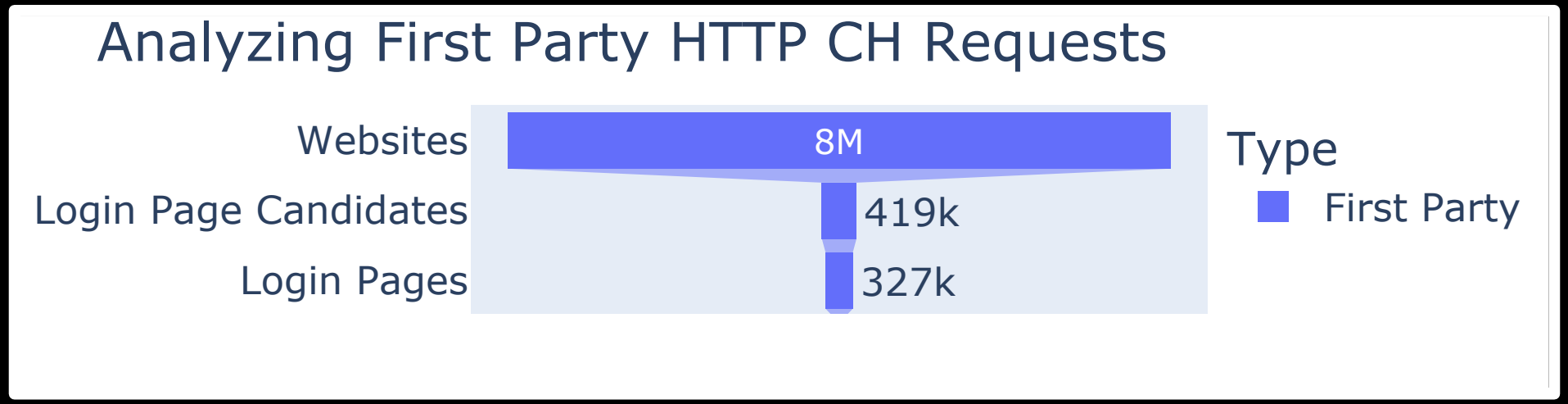

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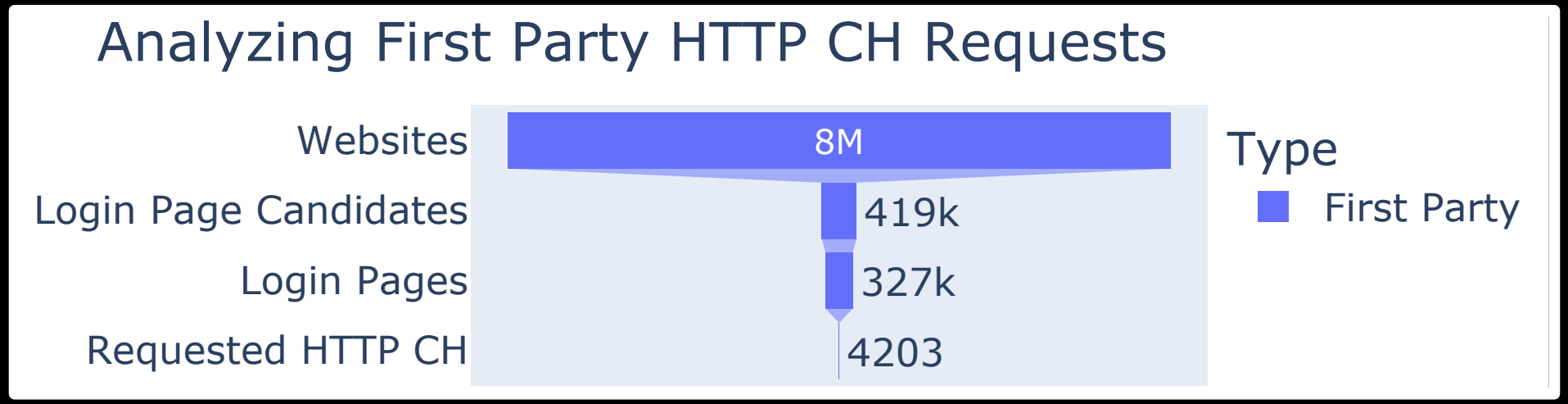

# Except for Embedded Third Parties

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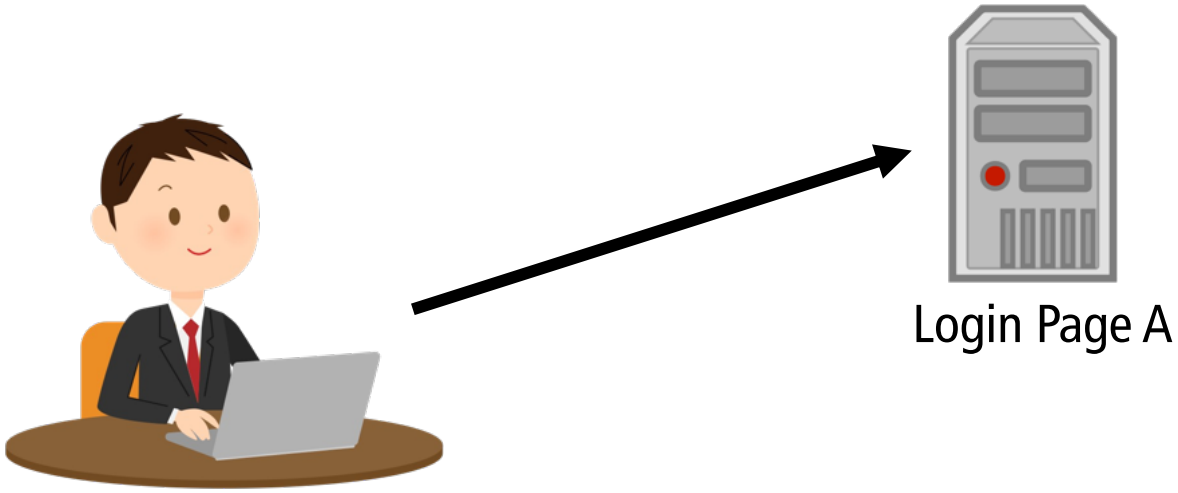

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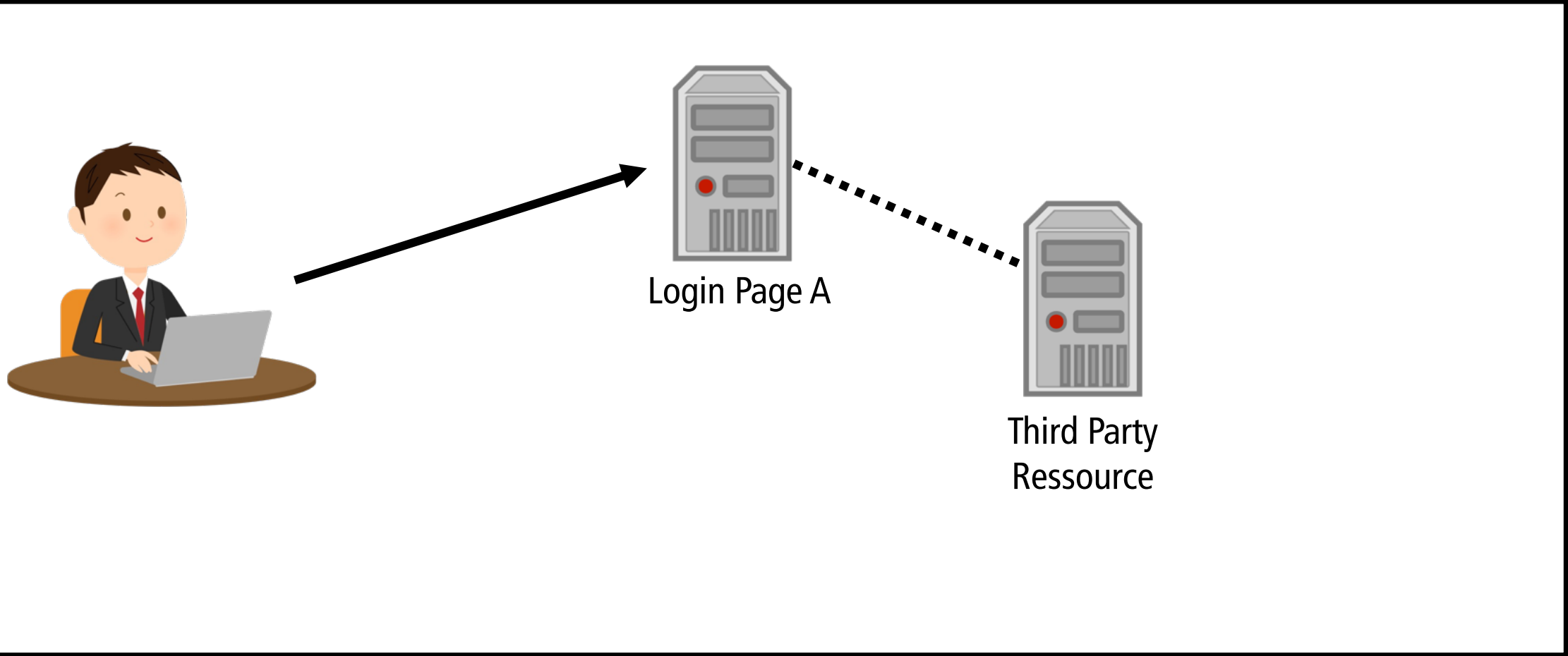

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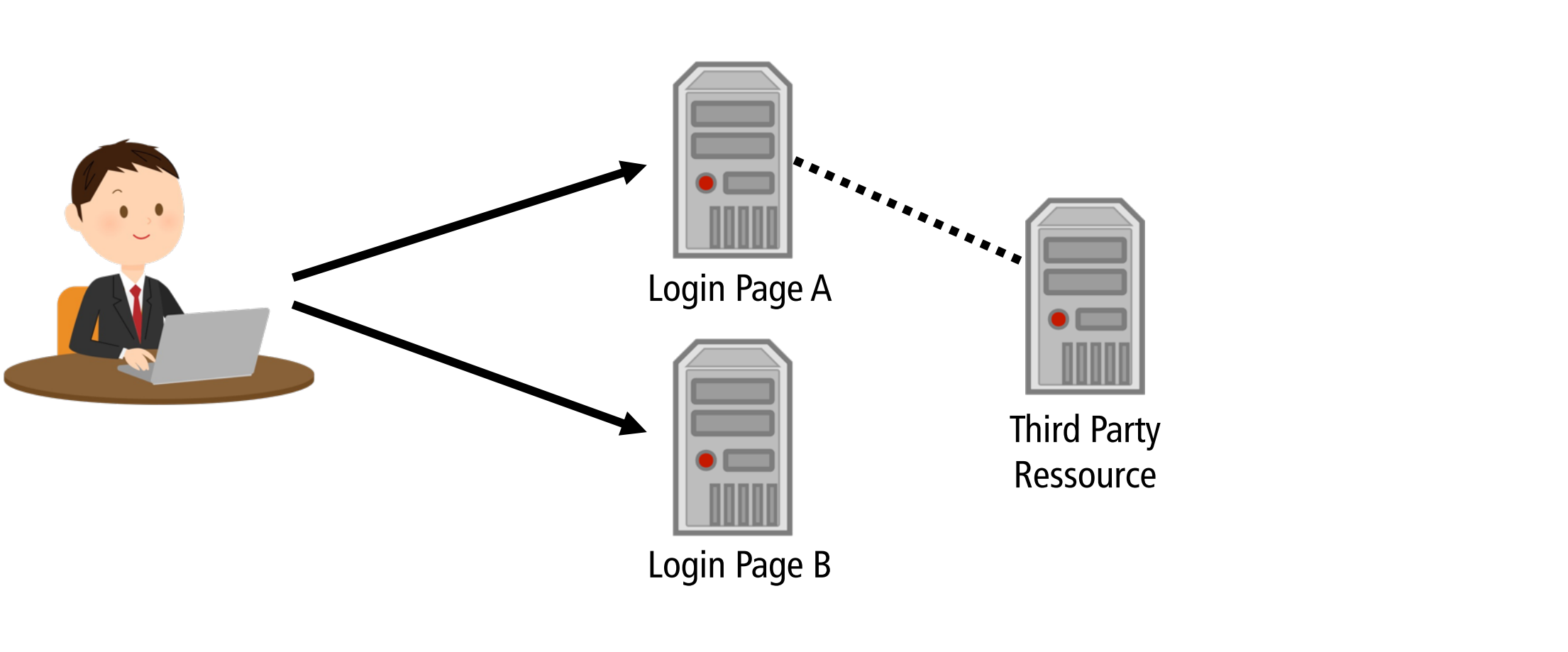

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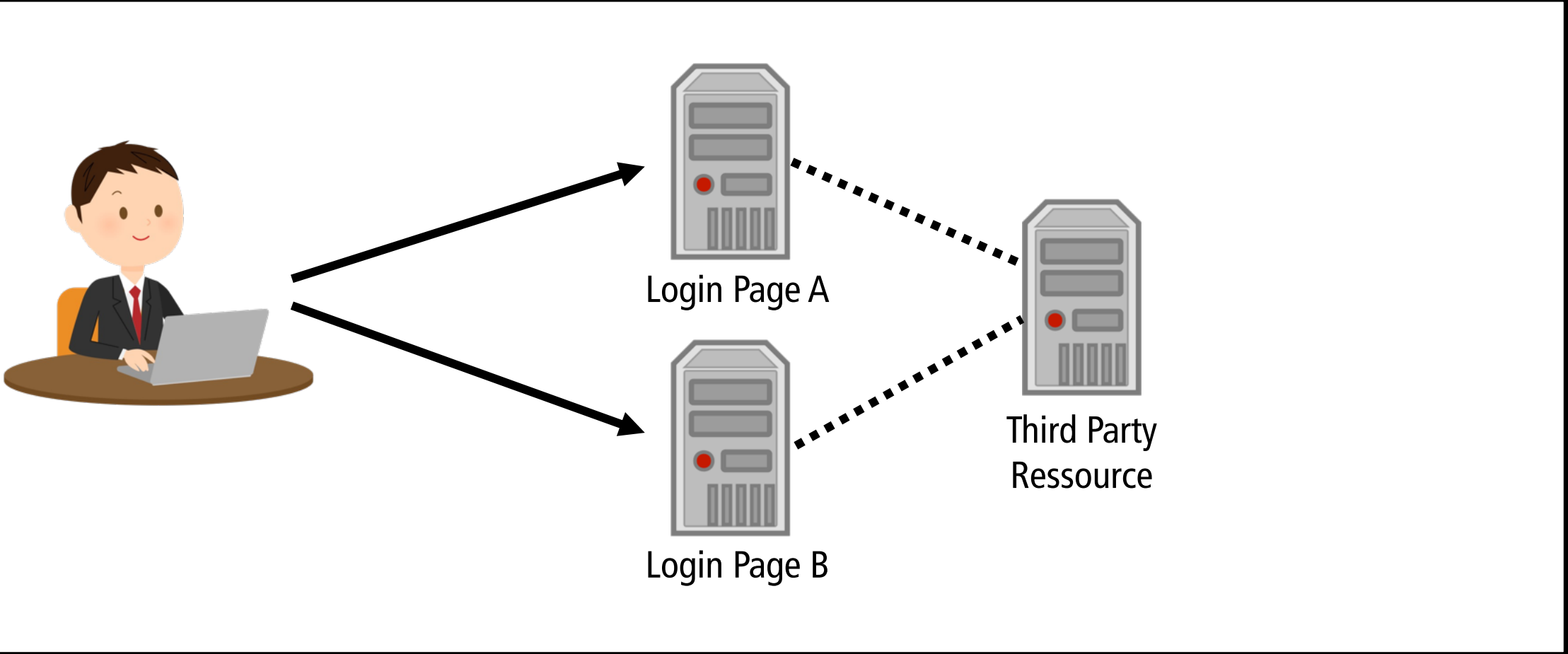

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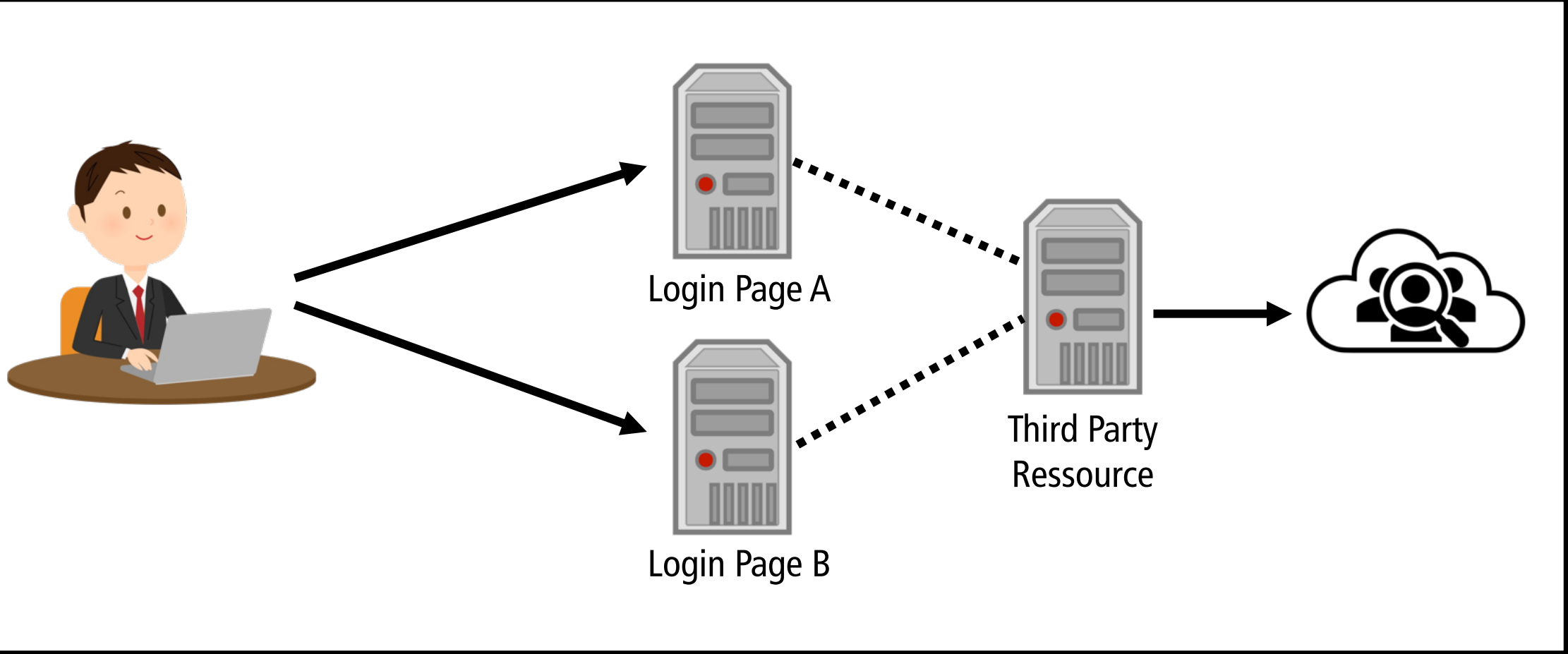

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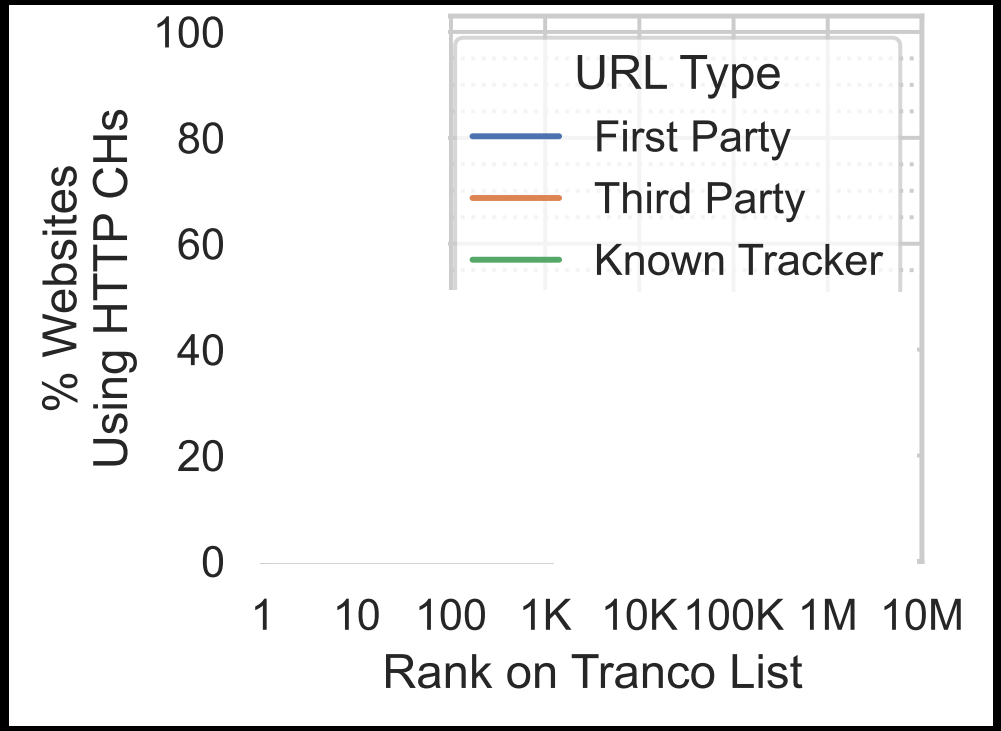

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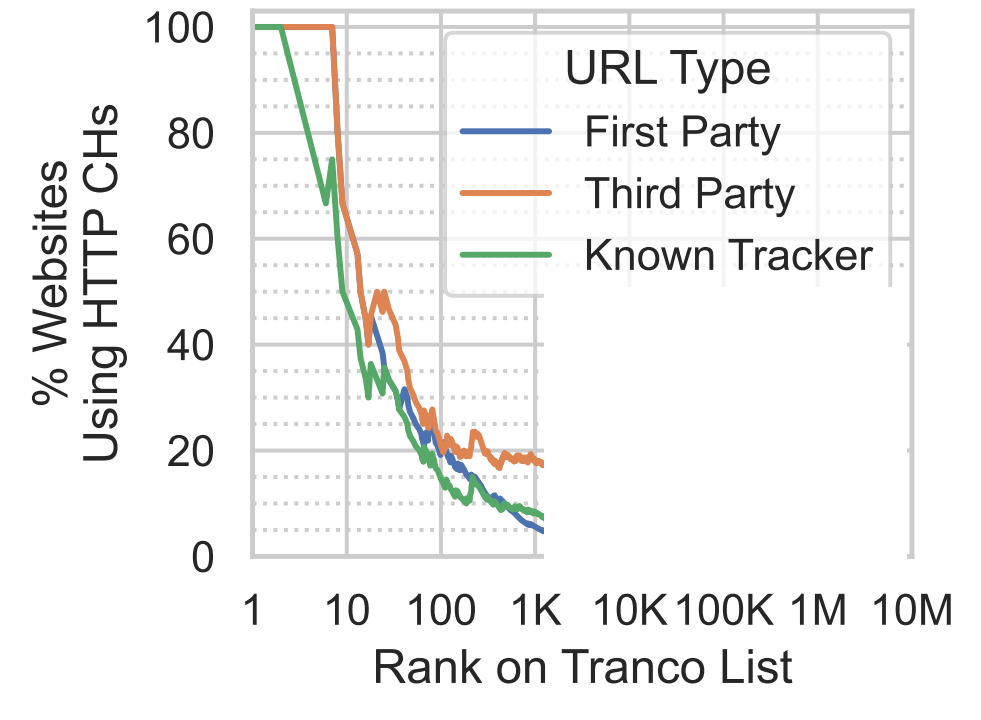

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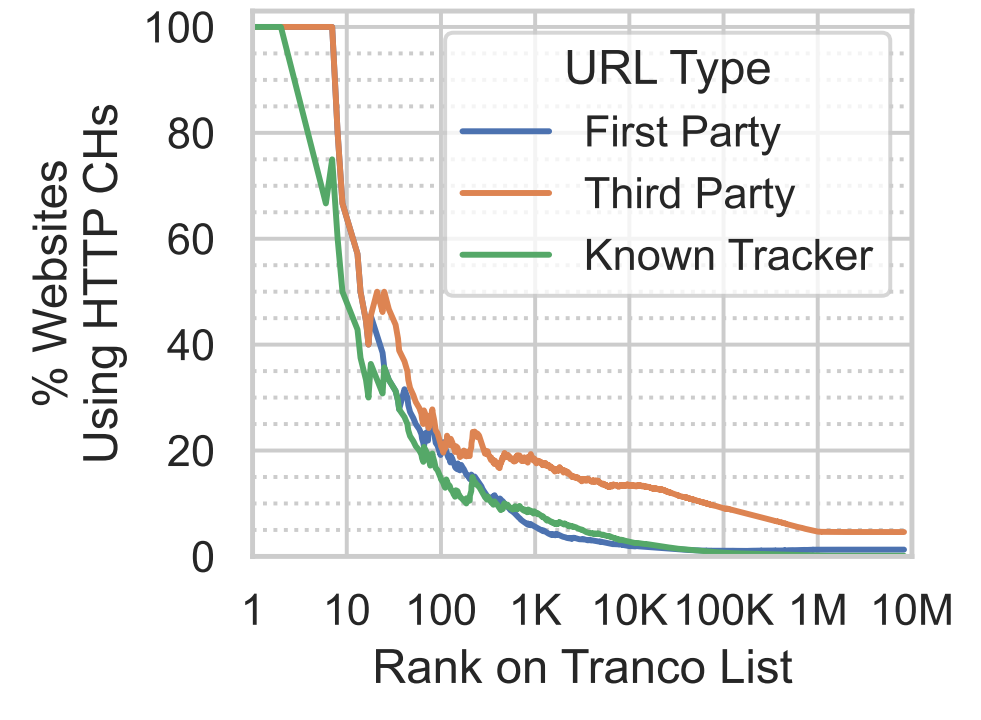

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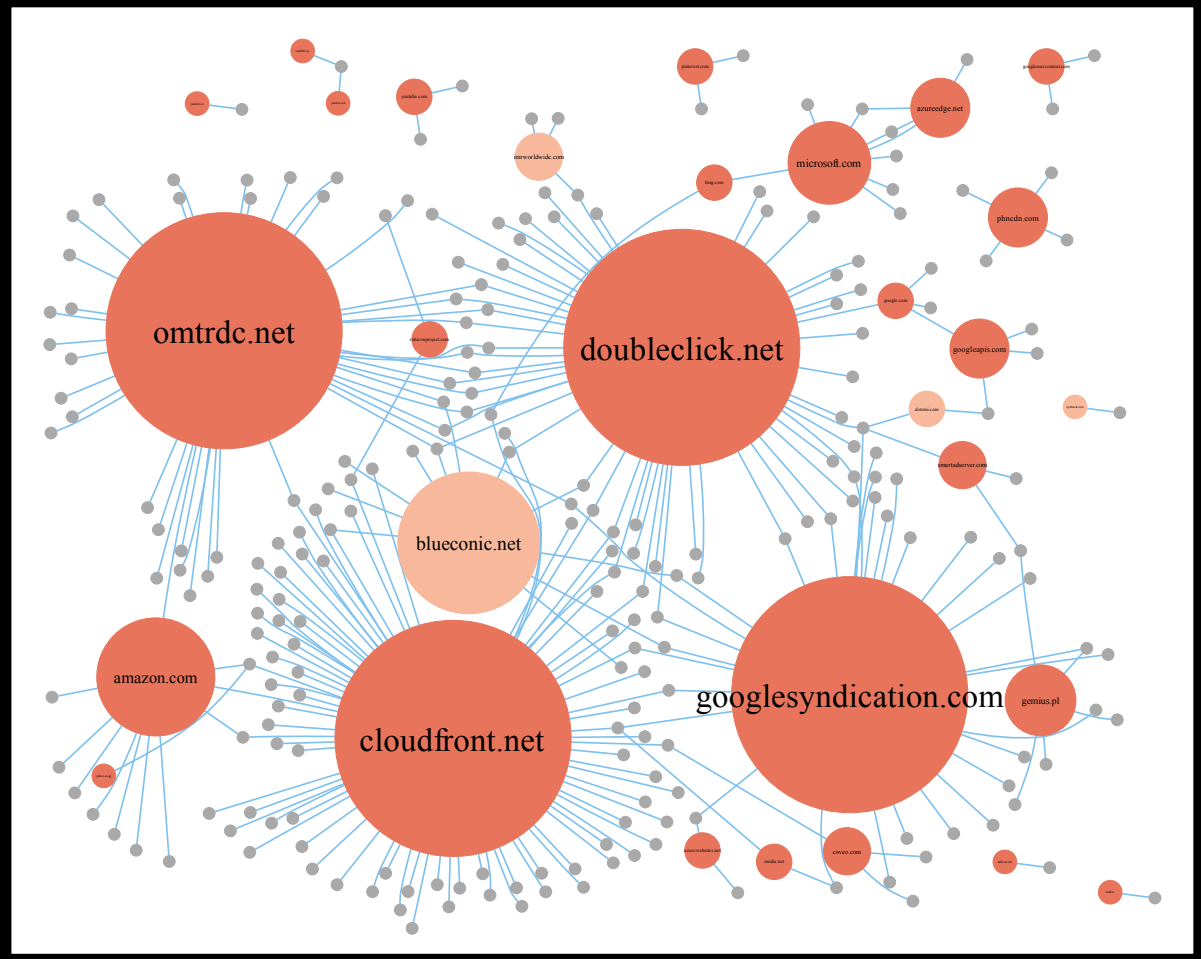
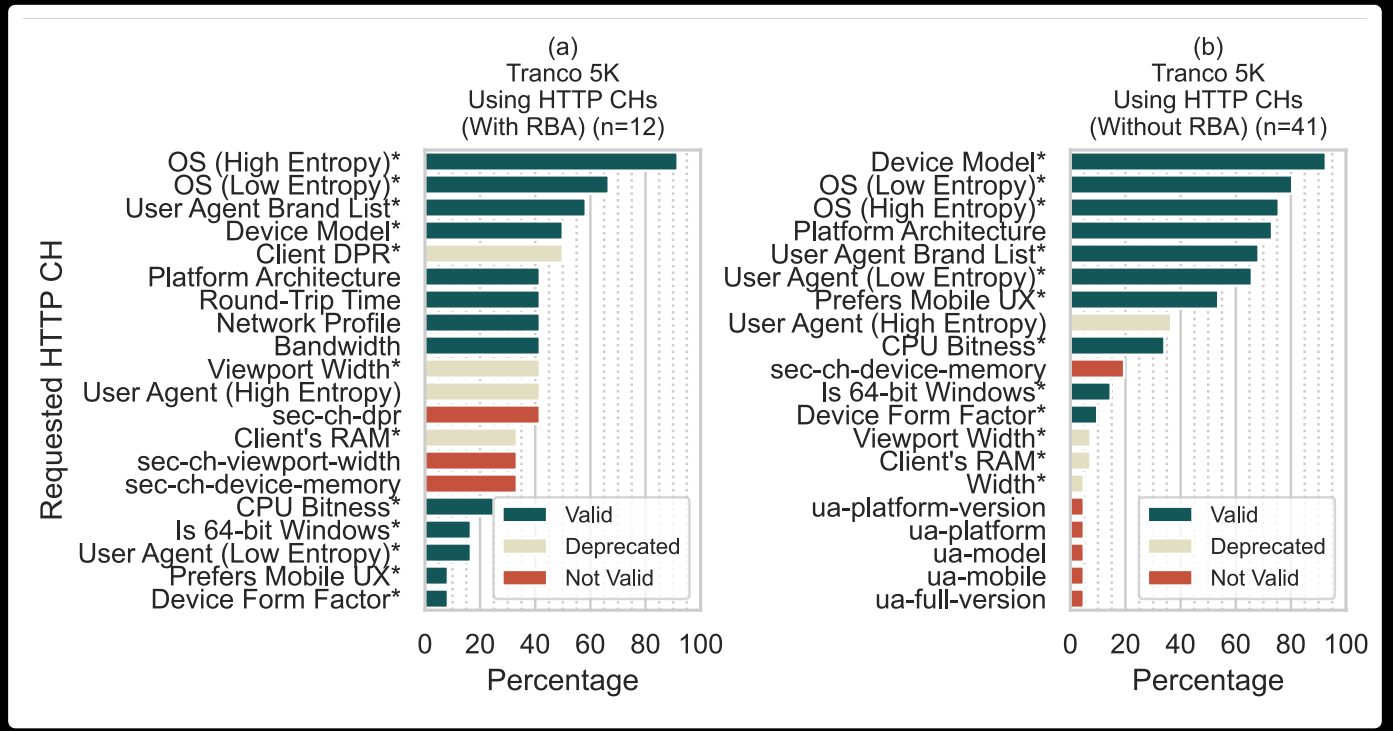


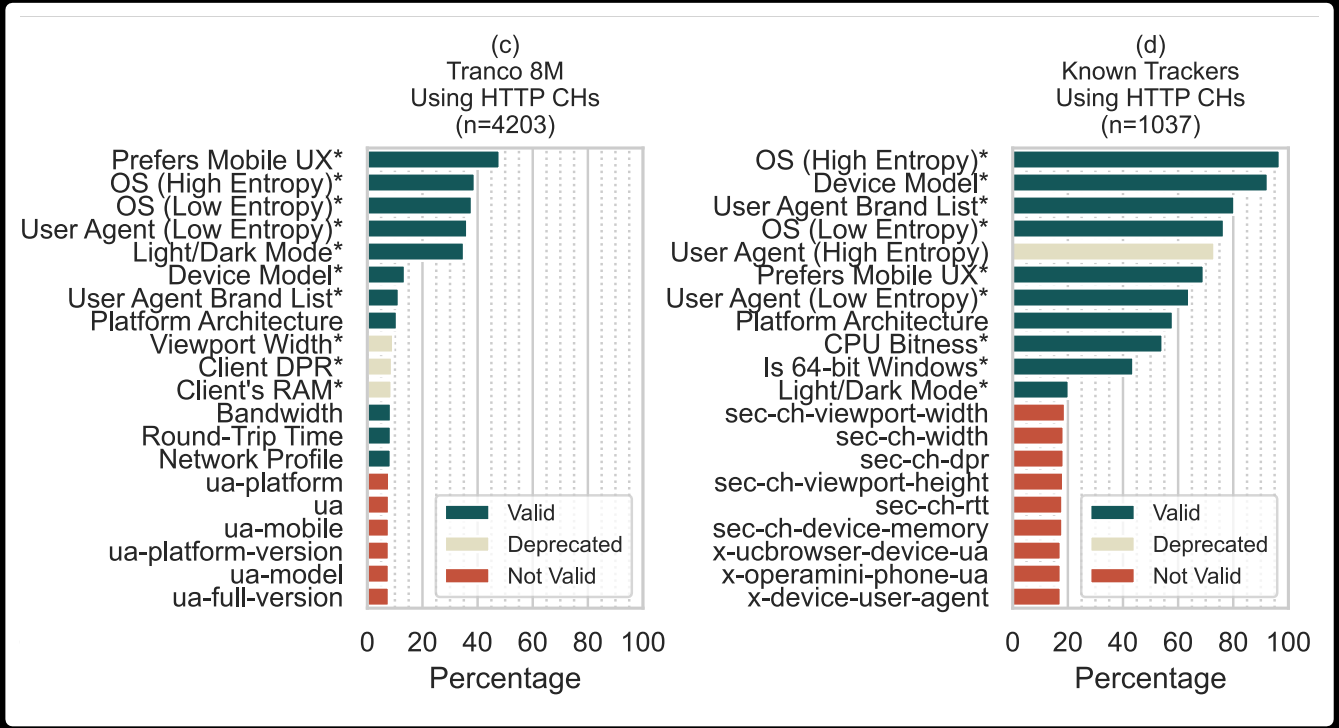
# Collected Data Differs on Use Case

- Websites with risk-based authentication (RBA) request higher entropy data than those without

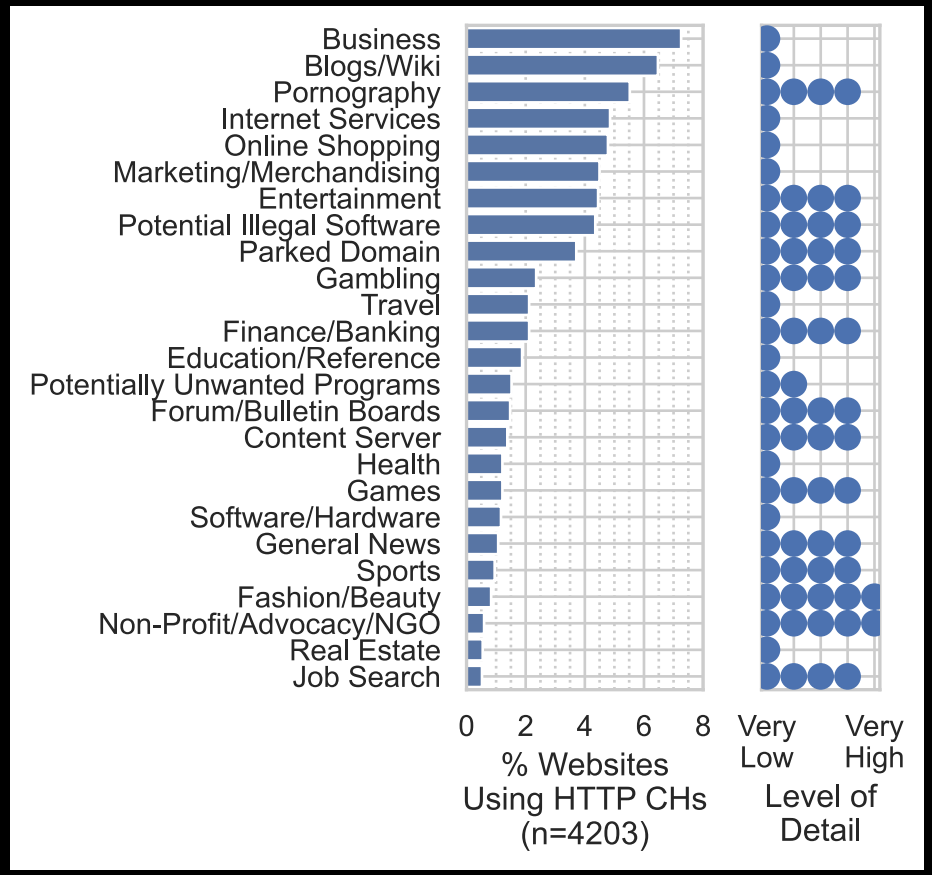


# Collected Data Differs on Use Case

- Known trackers collect more high entropy data than general websites



# Website Type Matters, Too



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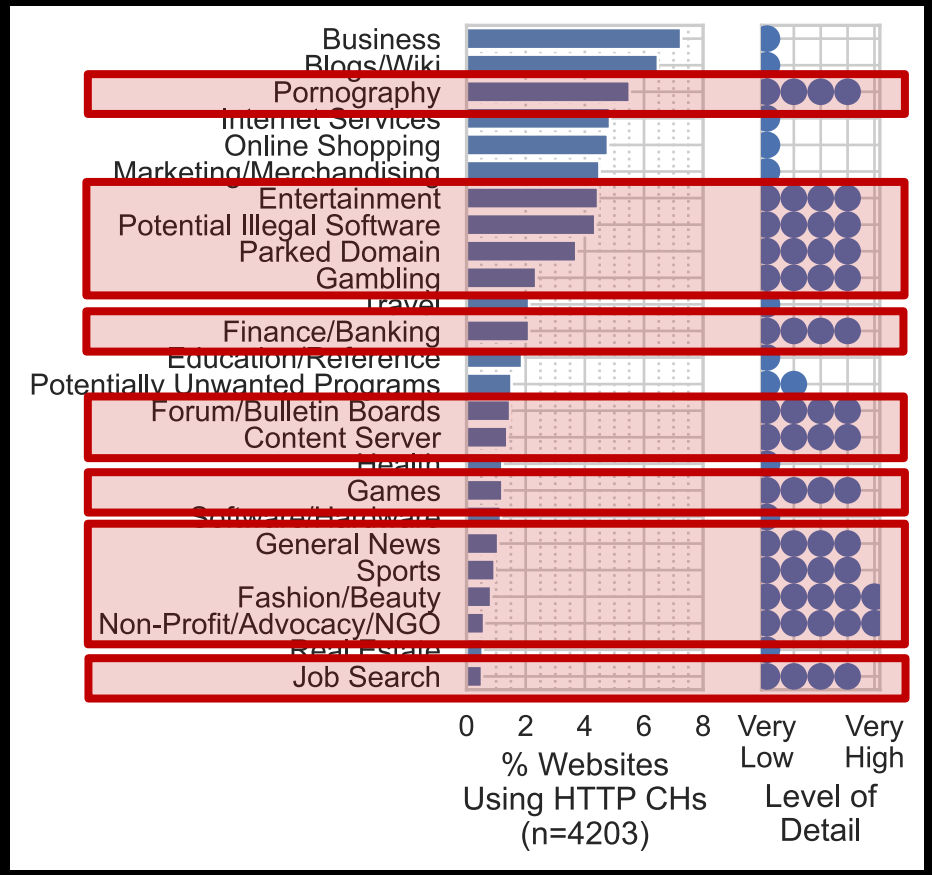
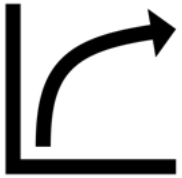


# Summary

*rbainfo.org/clienthints

# Summary



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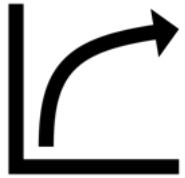

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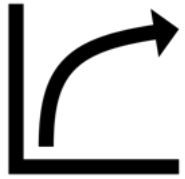

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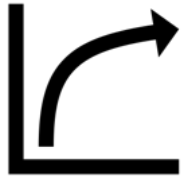

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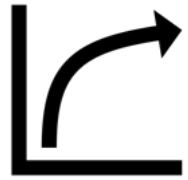

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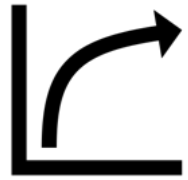

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- Crawling data provided as open data*
- Login URLs provided to ethical researchers on request

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# Thank you

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