Privacy-Preserving Social Plug-ins

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What is this talk about?

- Social plug-ins today pose a serious privacy risk

  that most users don't know about
- Privacy risk remains even if one doesn't use social plug-ins
- We propose and implement a novel design for privacy-preserving social plug-ins without sacrifices in functionality
- Our design could be adopted by social networks as service

What are Social Plug-ins?

- Provided by online social networking services (SNS)
- Included in third-party Web sites
- Enable users to interact with the page content through their social identity via a series of actions:

- Offer personalized information based on social data

How popular are Social Plug-ins?

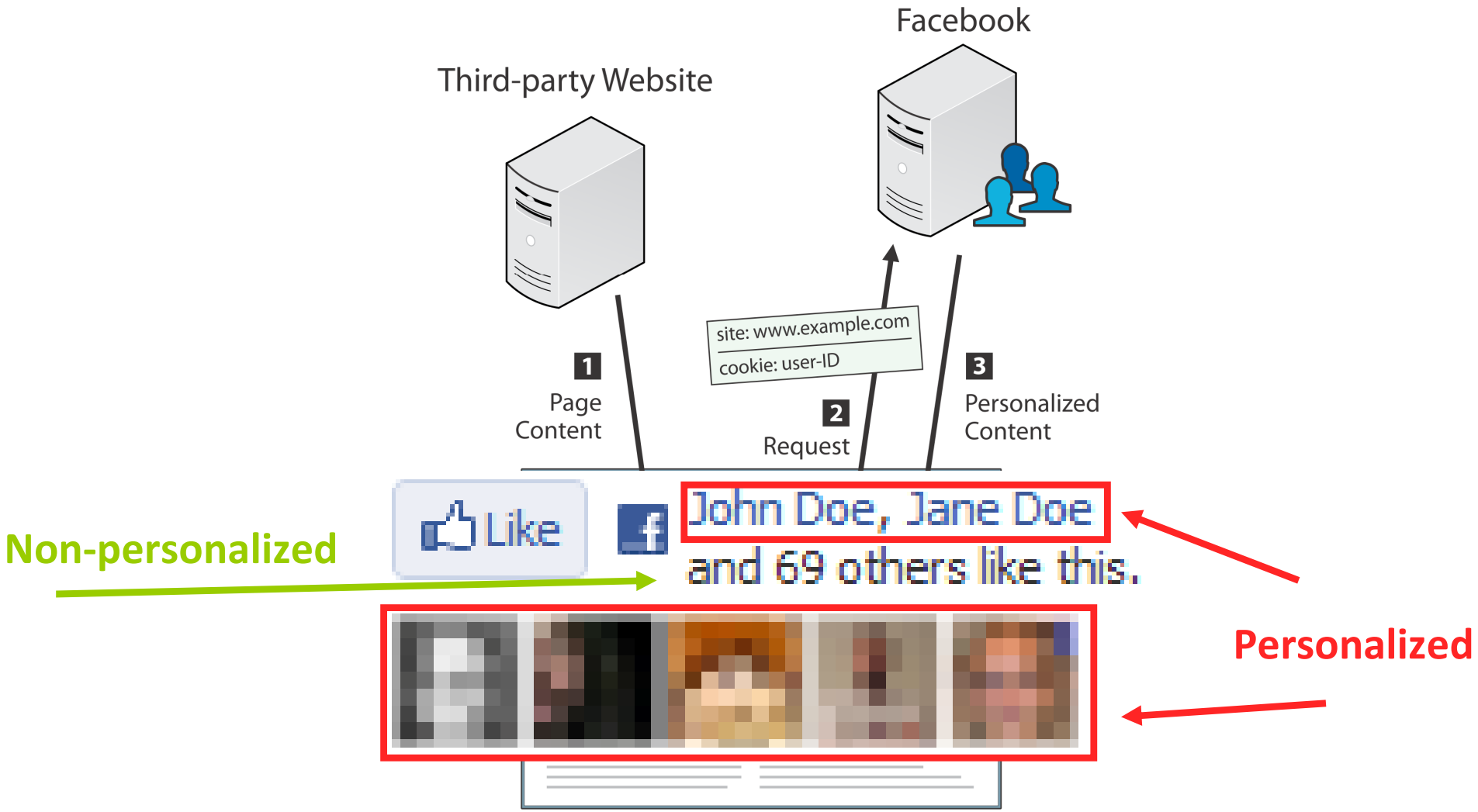
- Facebook has 955 million users (*Facebook Newsroom 2012)*
- 33% of the Top 10K Web sites have integrated the Like button

  (at least 2 million in total)

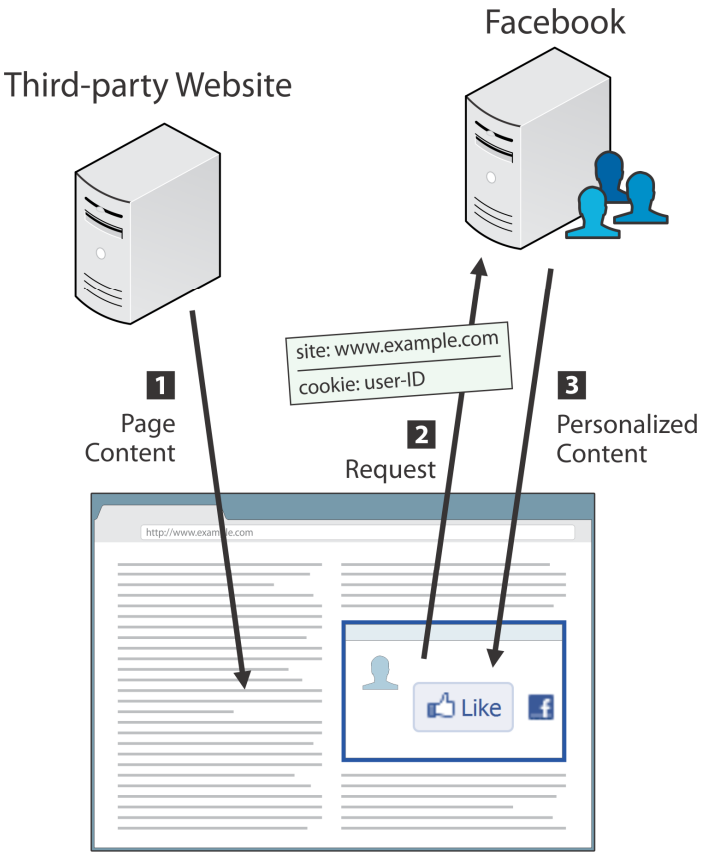
- Google Mail has 425 million users (*Google I/O 2012)*
- 22% of the Top 10K Web sites have integrated the +1 button

  (at least 1 million in total)

How do Social Plug-ins Work?



Privacy Risks of Social Plug-ins



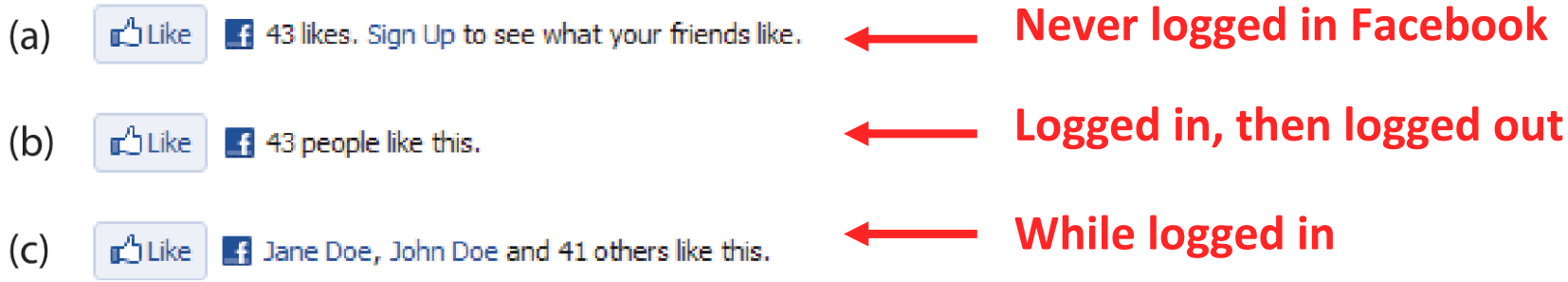
- The ubiquity of social plug-ins enables cross-site tracking
  - 23% of the sites have a FB plug-in [Roesner et al. NSDI 2012]
- Social networking services know the user's real name (vs advertisement networks)
- Don't have to interact with a plug-in
- Cannot know beforehand whether a page carries social plug-ins

Who knows I visited wired.com?

Preventing Privacy Leaks

- Logging Out of the Social Networking Service?
  - In 2011 at least 3 FB cookies persisted after logout

    One of them was the user's unique ID!
    - Facebook classified this as a bug and fixed it
  - Today (2012) at least 2 cookies persist ☺
    - uniquely identify "public computers", "suspicious activity"



Preventing Privacy Leaks

- Disabling Third-party Cookies?
  - Social plug-ins will render as if the user is not a member of the social networking service
  - However, doesn't always protect from third-party tracking

	[R]	[W]	[R]	[W]
I.E. 9	Y	N	Y	Y
Firefox 13	N	N	Y	N
Chrome 21	N	N	N	N

third-party cookies

HTML5 local storage

  - In Chrome it's trivial for a third party to position itself as a first party (popup window – native blocker won't help)
  - In Safari third party cookies are blocked unless the user interacts with them (or an automated script submits an HTML form)

Preventing Privacy Leaks

- Enabling the Do Not Track HTTP Header?
  - Signal “opt-out from tracking” to the receiving Web site
  - Policy technique, no technical enforcement
  - The definition of tracking is still up for discussion
  - Very few sites support it at the moment

- Removing third parties from Web pages?
  - Commonly used to filter out advertisements
  - Social plug-ins will not appear in the page at all
  - Users lose the option of viewing and/or interacting with some of the social plug-ins if they want to

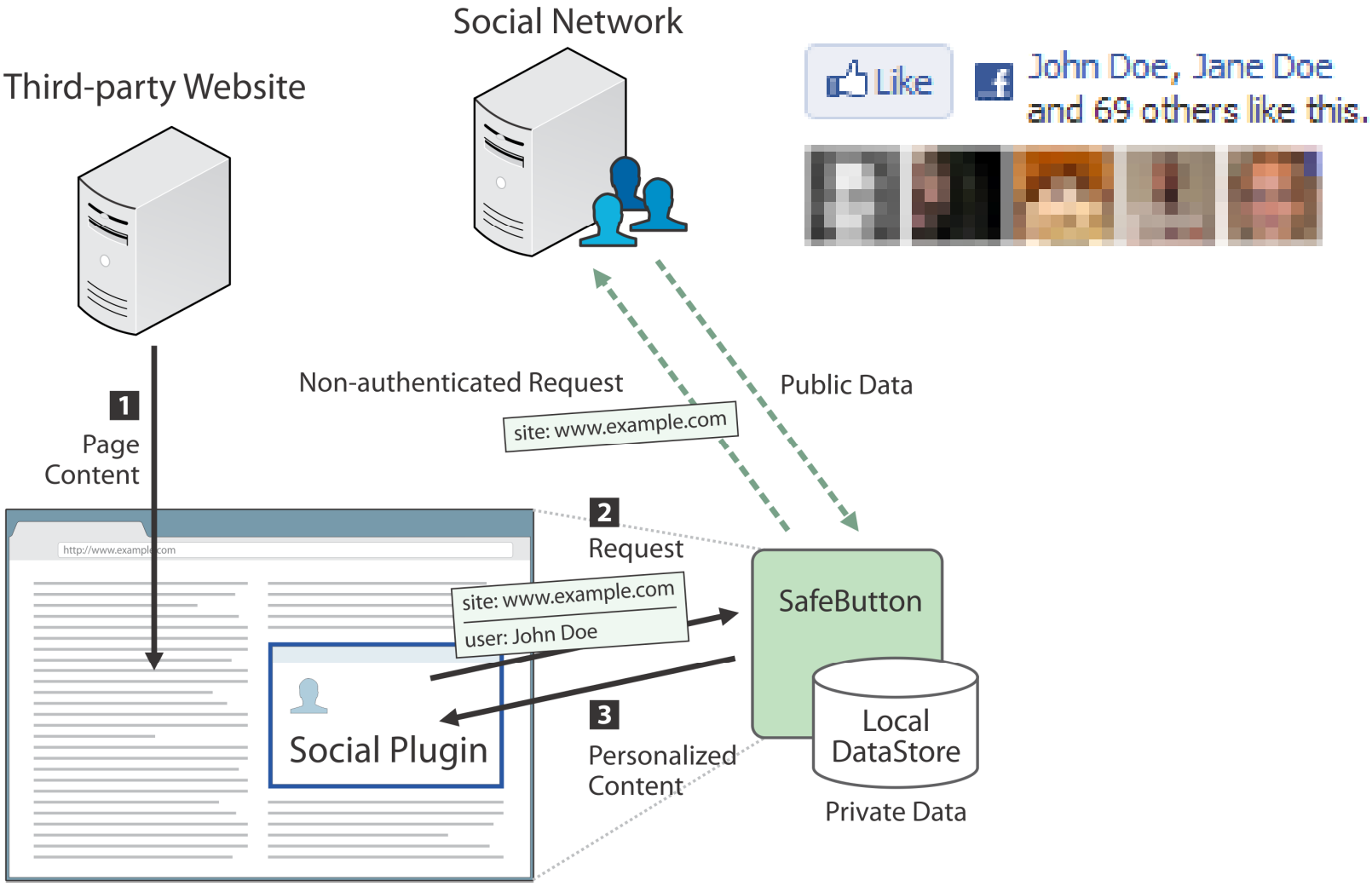
Privacy vs Functionality Dilemma

- Users are asked to choose between:
  - Privacy but also loss of personalization or social plug-ins altogether

  OR
  - Functionality but also sharing Web activity with social networks

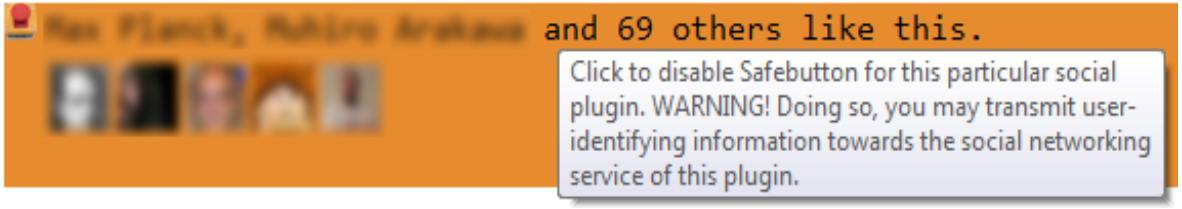
- Why should there be a dilemma? ☺

Privacy-Preserving Social Plug-ins

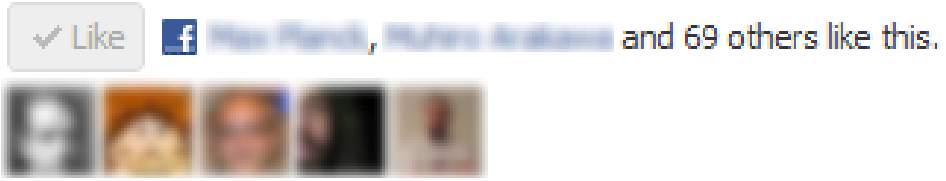


The SafeButton Browser Extension

- For Chrome and Firefox



- Disables the original social plug-ins
- SafeButton DOM replacements preserve the same (personalized) content
- Upon interaction, the original plug-in is loaded to enable write functionality



SafeButton's Social Plug-in Support

Provider	Social Plug-in	SafeButton Support
Facebook	Like	Complete
	Send	Complete
	Comments	Partial*
Twitter	Tweet	Complete
	Follow	Complete
Google Plus	+1	Complete
	Share	Complete
LinkedIn	Recommend	Complete
	Shared	Complete
	Follow	Complete

** API shortcomings*

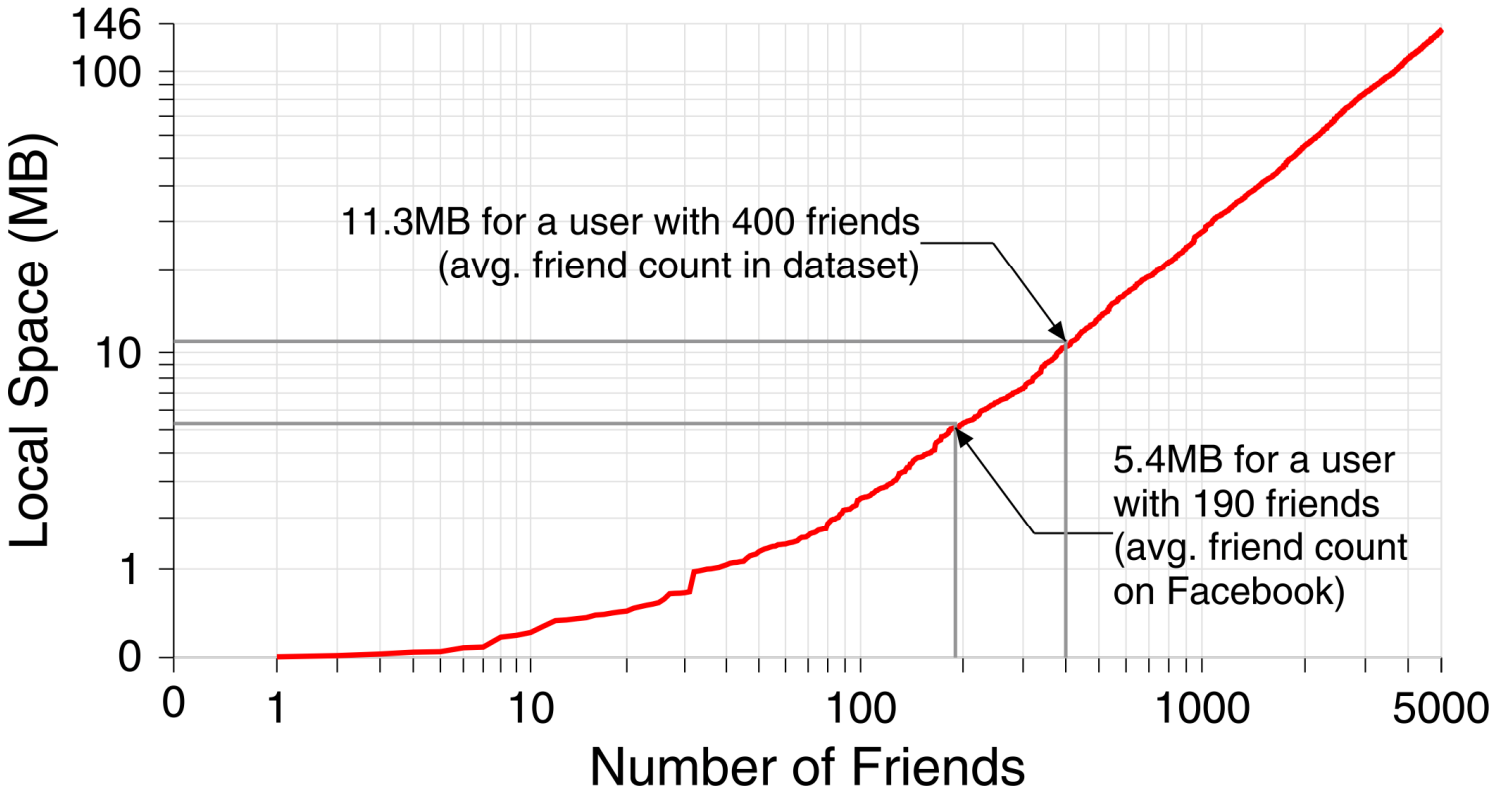
SafeButton's Bootstrapping

- Privacy protected from the beginning
- Downloading social data upon user's login

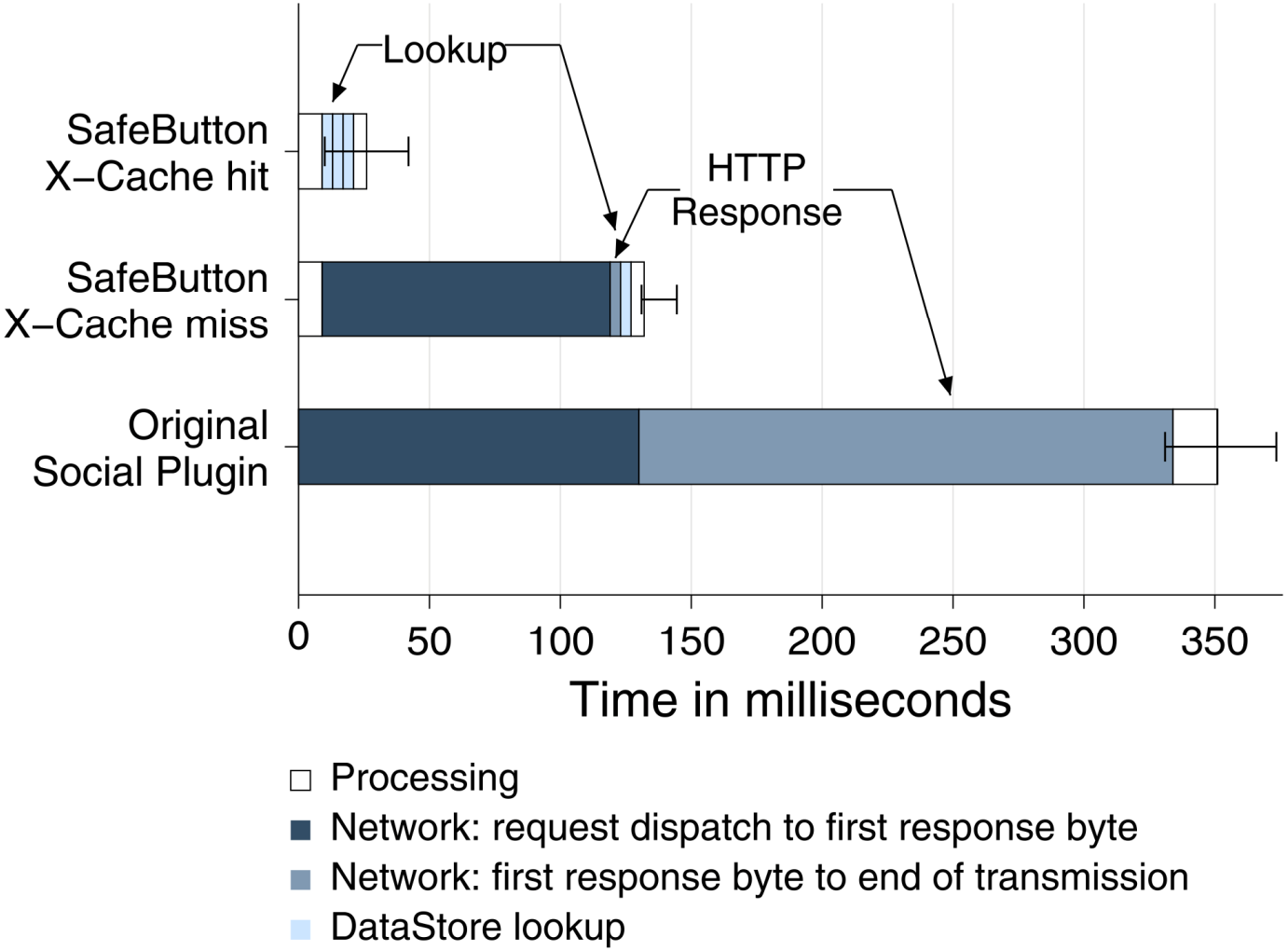
  to social network service
- Bootstrapping the local store for 5,000 friends

  took a little less than 10 hours (room for optimization)
- Periodic, incremental updates

SafeButton's Resource Requirements



SafeButton's Performance

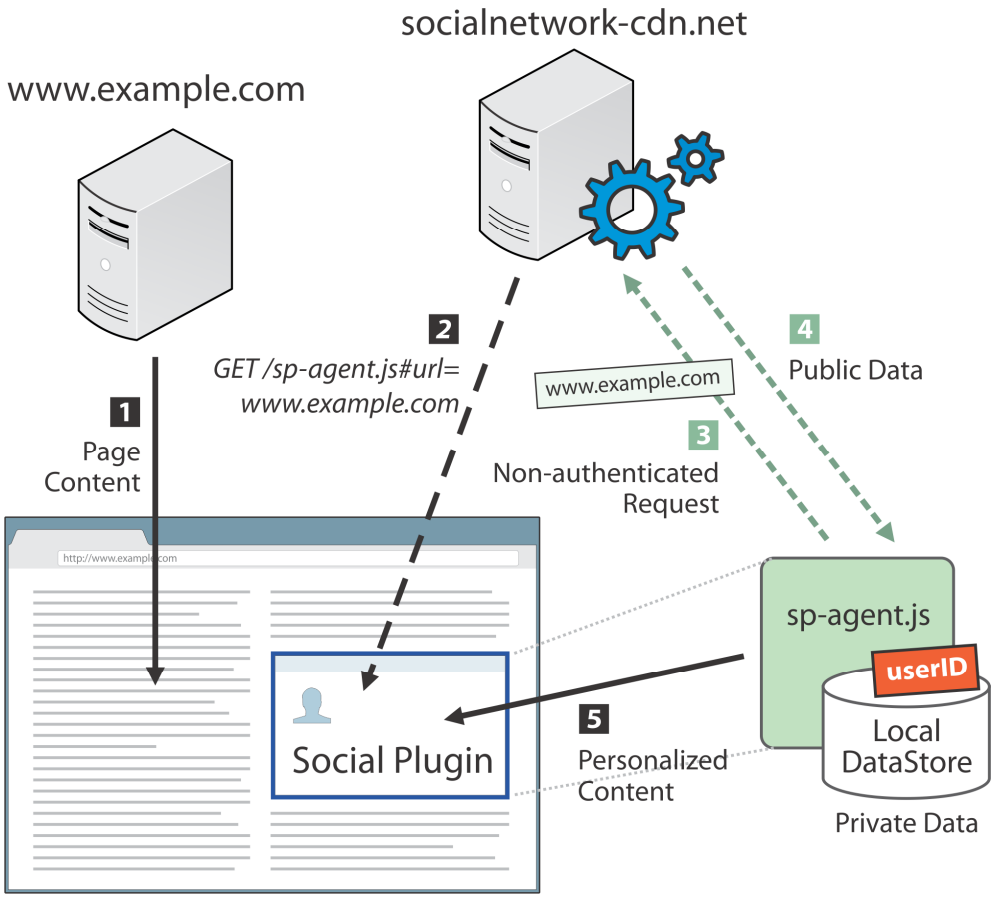


SafeButton As a Service

- Web browser extensions are not good enough
  - Users unaware of privacy risks of social plug-ins
  - Users unwilling or unable to install extensions
  - Adoption of AdBlock 3.1%, NoScript 0.4% in Firefox

- Ideally we want a design offered by social networking services themselves
- Implemented with Web technologies that enable an in-browser solution without additional software

SafeButton As a Service



- Pages incl. social plug-ins as usual
- Social network will return a SafeButton agent

- How to avoid leaking user-identifying information in the process?
  - Isolate social plugins to diff. domain
  - Secure message passing with SNS
  - Fragment identifiers parameters
  - Cachable agent
  - Encrypted data store

Discussion

- Keeping social data locally in the client may introduce security risks (malware, snooping friends, stolen disk)
  - Is it really that different from keeping the data in the cloud but running unstrusted software in the user's computer?
  - It's equally easy for tech-savvy friends to install key-logging software or inspect SafeButton's data store
  - An encrypted SafeButton data store will provide the same protection against disk theft as will the user's practice of logging out (or not) from social networking services.

Summary

- Identified privacy issues of current social plug-ins that most users aren't aware of
- Pointed out the dilemma between privacy and functionality
- Presented our proposal for privacy-preserving social plug-ins which eliminates that dilemma
- Suggested a novel design for privacy-preserving social plug-ins as a service

http://tinyurl.com/safebutton

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