CSE 484 / CSE M 584:
# Web Privacy (continued)

Fall 2024

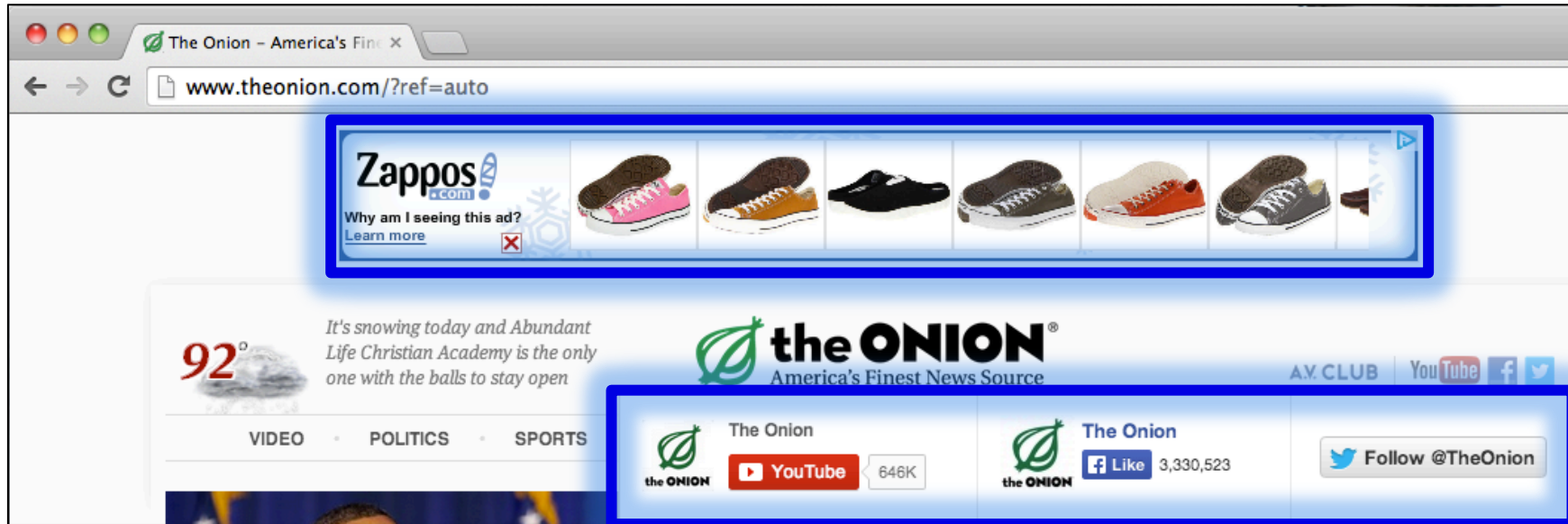Franziska (Franzi) Roesner
franzi@cs

Announcements

- Lab 2 due next Friday (11/15)
- Homework 3 out on Friday (due 11/22)
  - Topics: passwords, mobile security, usable security
- Monday is a holiday (Veteran's Day): No class or office hours

Cookies (etc.) Enable "Anonymous" Tracking

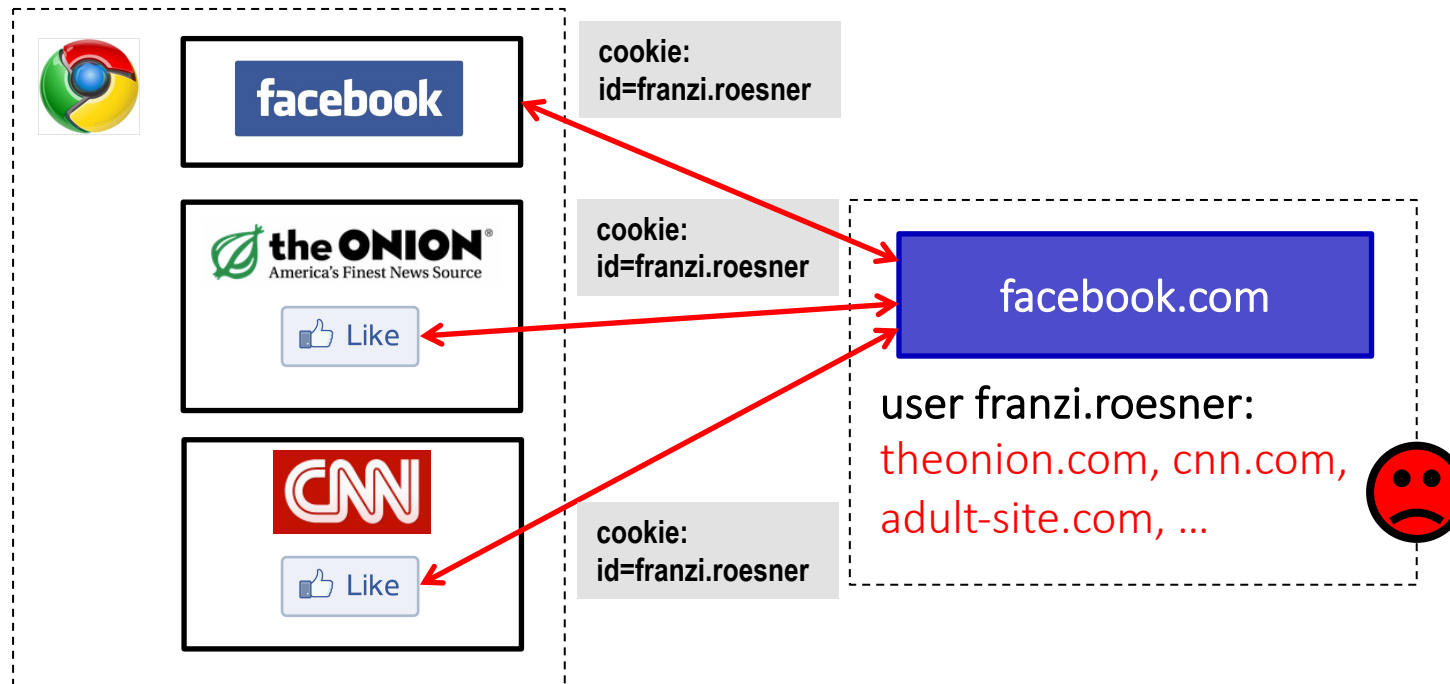Trackers included in other sites use third-party cookies containing unique identifiers to create browsing profiles.

cookie: id=789

cookie: id=789

criteo.com

user 789:
theonion.com, cnn.com, adult-site.com, ...
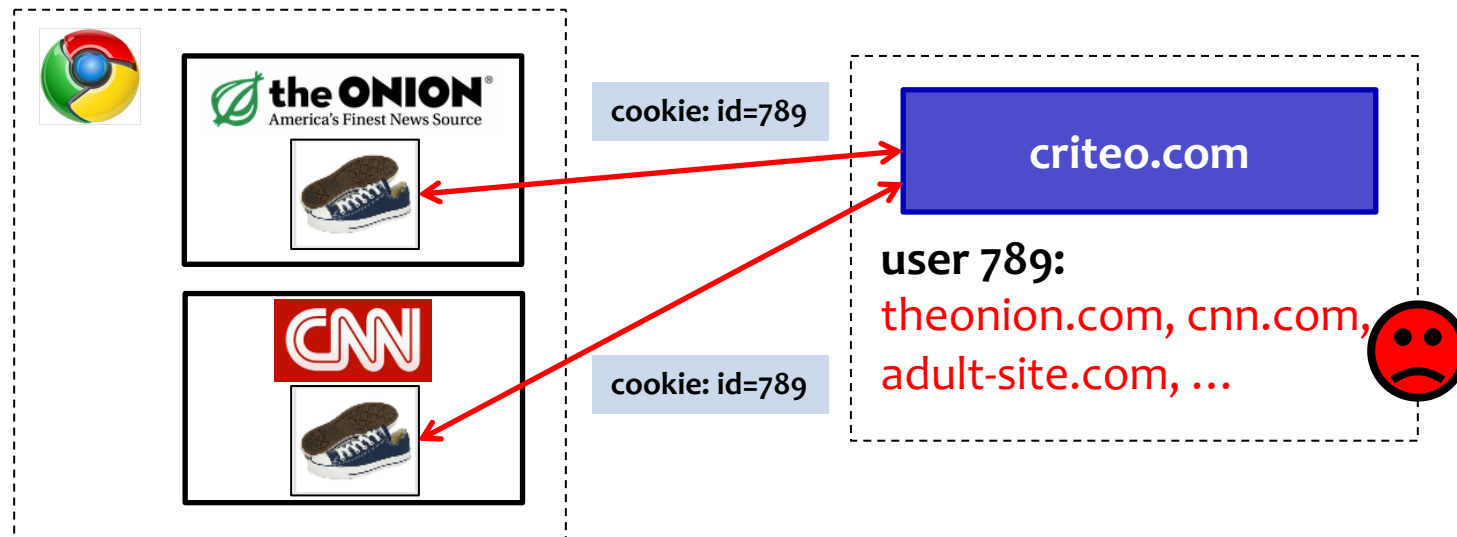
Other Trackers?

"Personal" Trackers

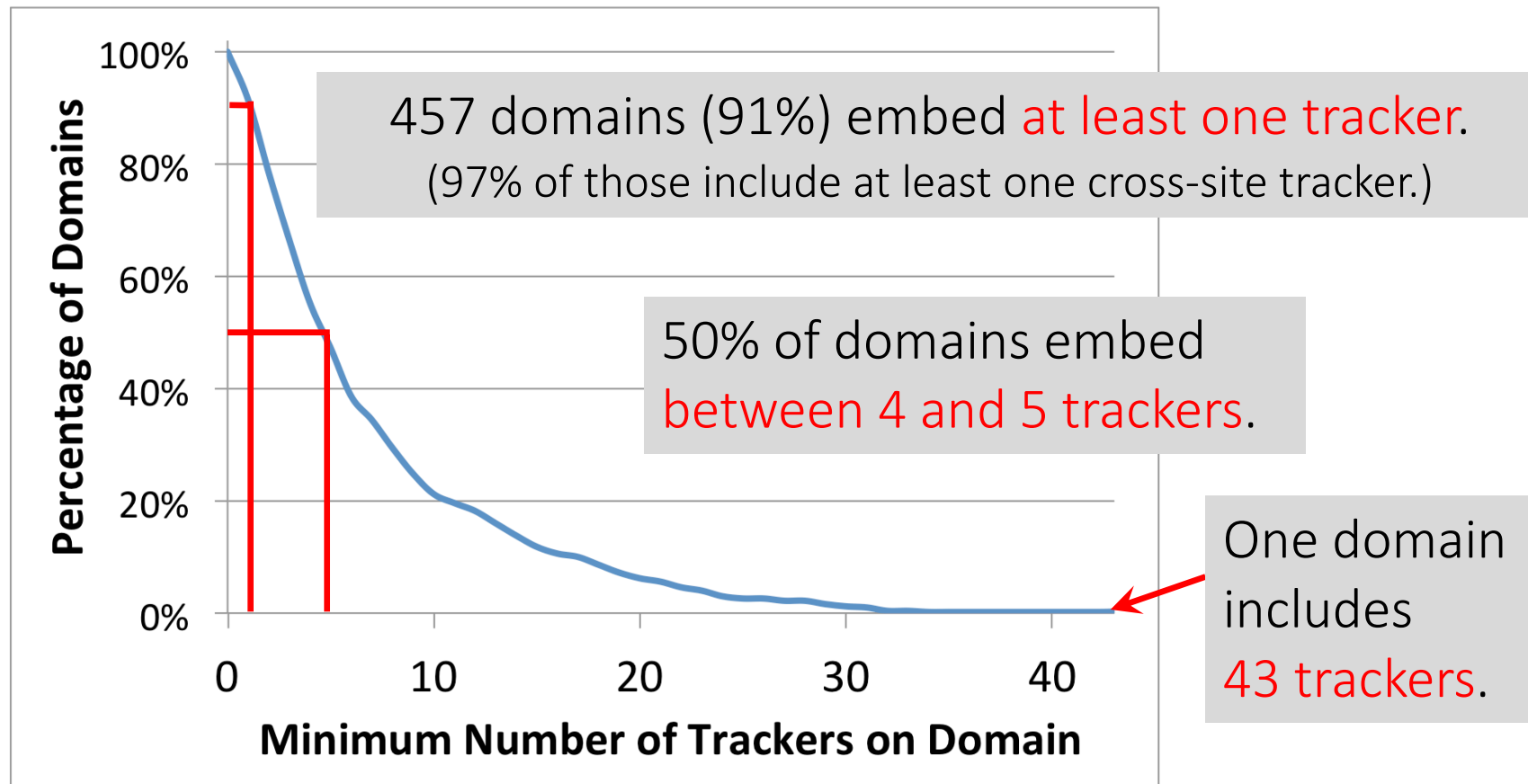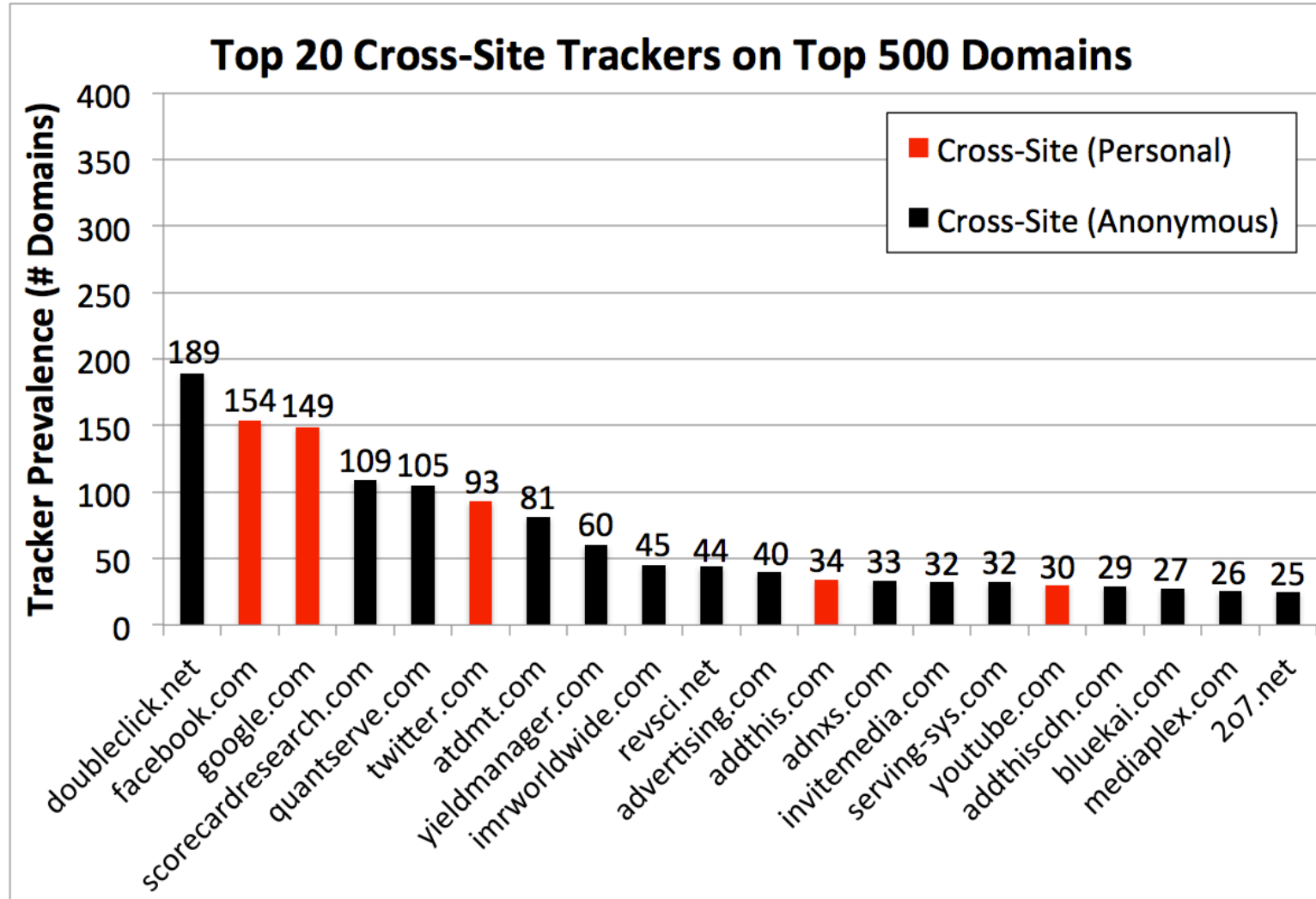# Personal Tracking

- Tracking is not anonymous (linked to accounts).
- Users directly visit tracker's site → evades some defenses.

How prevalent is tracking? (some years ago)

524 unique trackers on most popular top 500 websites (homepages + 4 links)

457 domains (91%) embed at least one tracker.
(97% of those include at least one cross-site tracker.)

50% of domains embed between 4 and 5 trackers.

One domain includes 43 trackers.

Chart axes: Y-axis "Percentage of Domains" (0% to 100%), X-axis "Minimum Number of Trackers on Domain" (0 to 40).

Who/what are the top trackers? (some years ago)

Top 20 Cross-Site Trackers on Top 500 Domains

Legend:
- Cross-Site (Personal) — red
- Cross-Site (Anonymous) — black

Y-axis: Tracker Prevalence (# Domains)

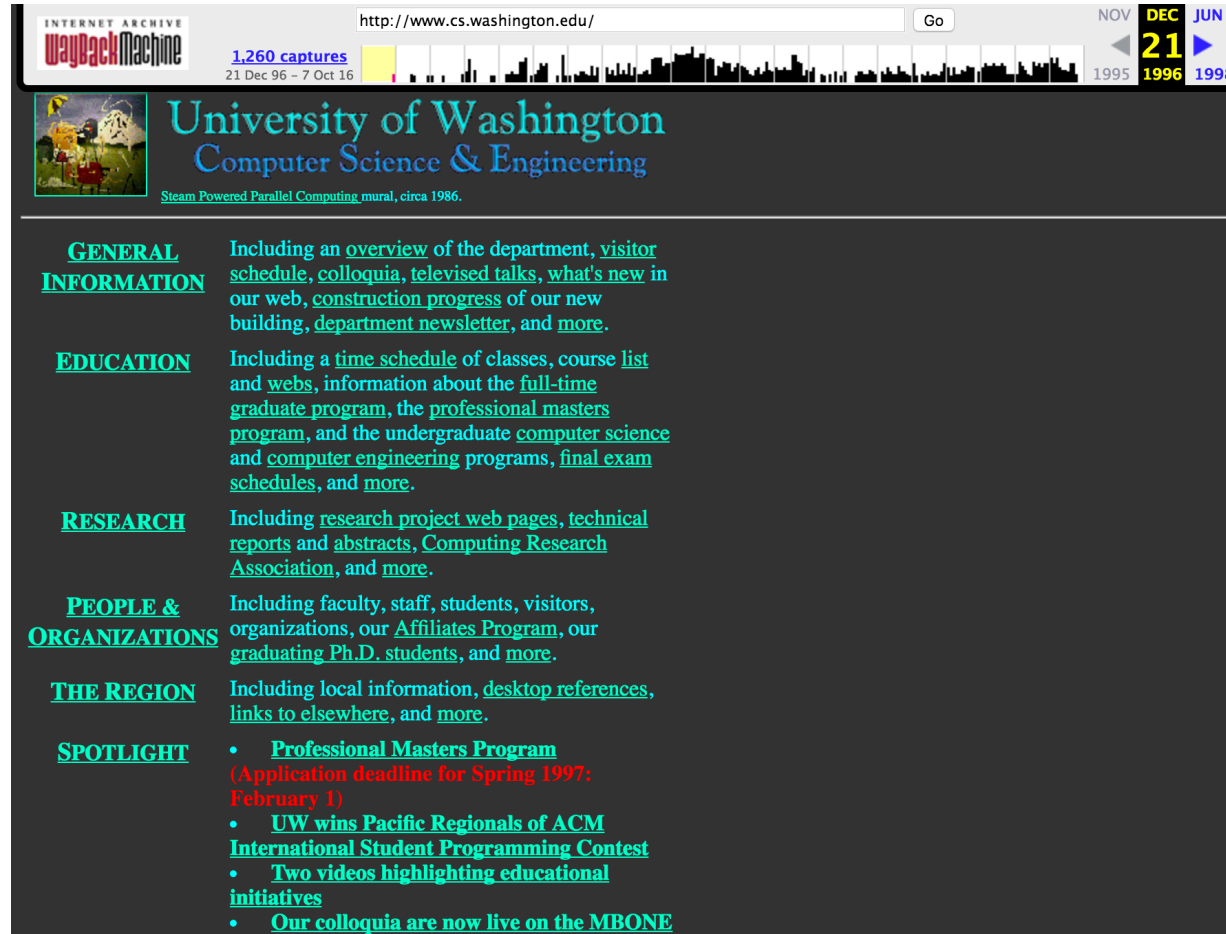| Domain	Value
doubleclick.net	189
facebook.com	154
google.com	149
scorecardresearch.com	109
quantserve.com	105
twitter.com	93
atdmt.com	81
yieldmanager.com	60
imrworldwide.com	45
revsci.net	44
advertising.com	40
addthis.com	34
adnxs.com	33
invitemedia.com	32
serving-sys.com	32
youtube.com	30
addthiscdn.com	29
bluekai.com	27
mediaplex.com	26
2o7.net	25

How has this changed over time?

- The web has existed for a while now…
  - What about tracking before 2011? (our first study)
  - What about tracking before 2009? (first academic study)

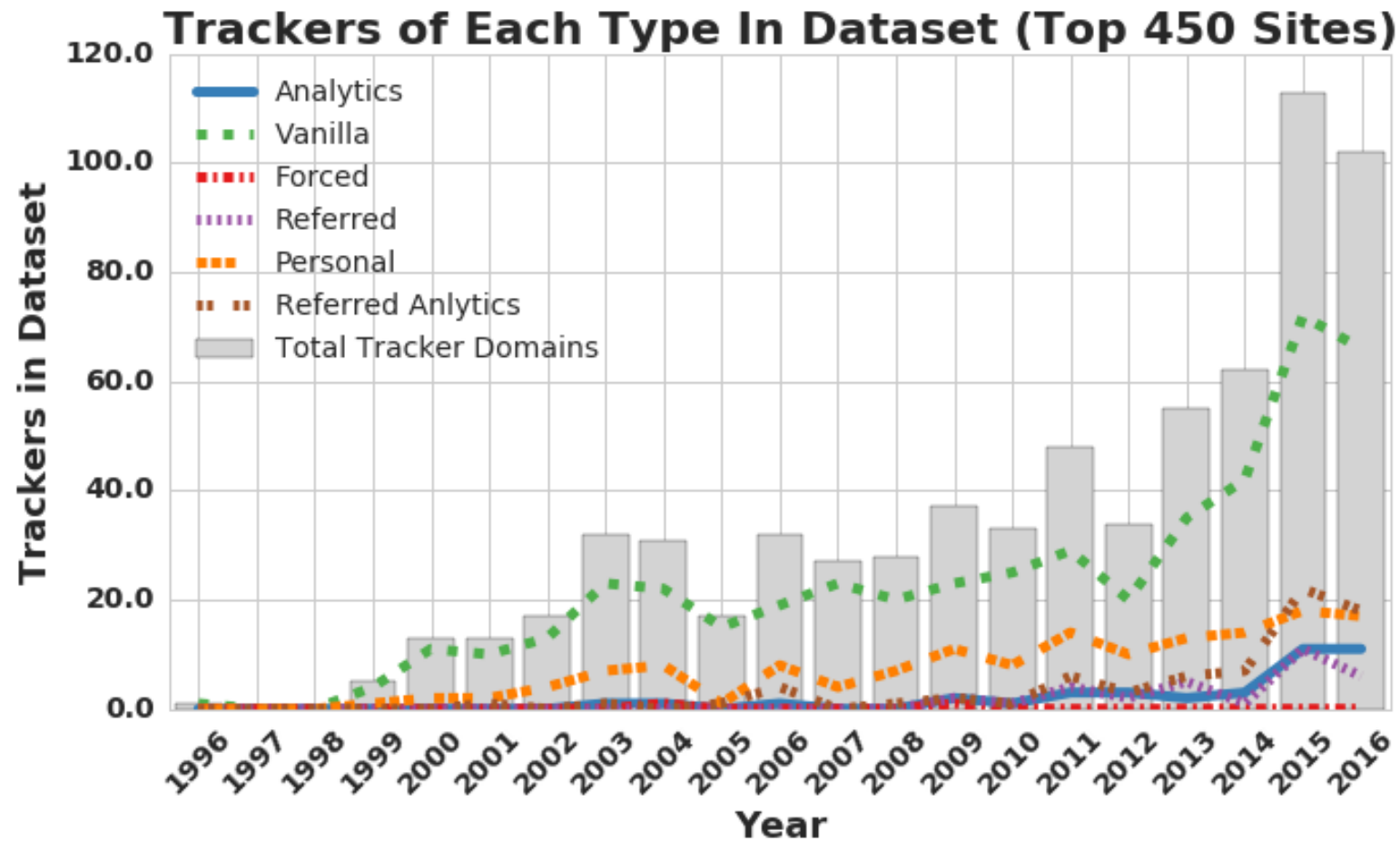- Solution: time travel!

The Wayback Machine to the Rescue

Time travel for web tracking: http://trackingexcavator.cs.washington.edu

1996-2016: More & More Tracking

- More trackers of more types

Trackers of Each Type In Dataset (Top 450 Sites)

Legend:
- Analytics
- Vanilla
- Forced
- Referred
- Personal
- Referred Anlytics
- Total Tracker Domains

Y-axis: Trackers in Dataset (0.0 to 120.0)
X-axis: Year (1996 to 2016)

1996-2016: More & More Tracking

- More trackers of more types, more per site

Third Parties Requested Per Site (Top 500 Sites)
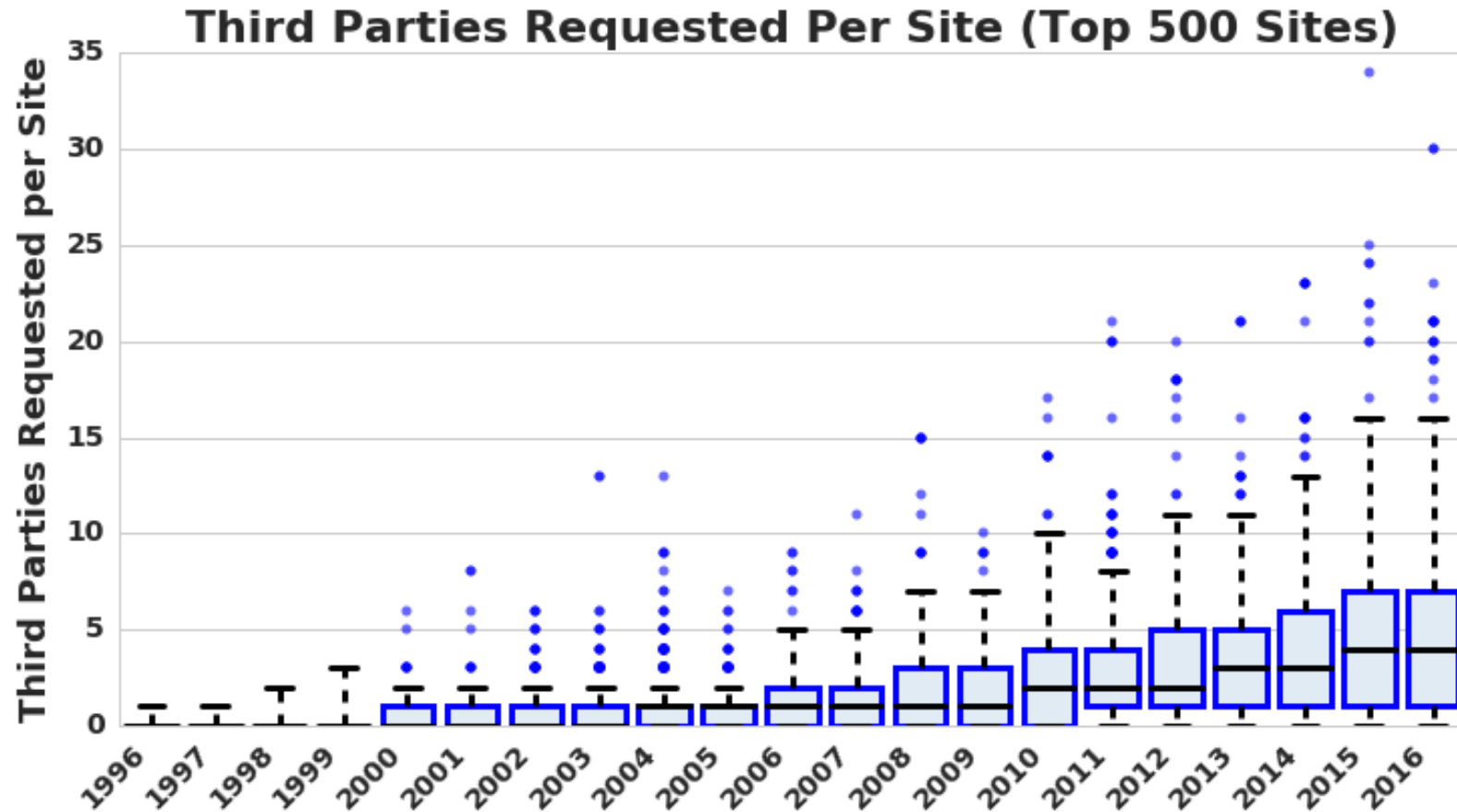
1996-2016: More & More Tracking

- More trackers of more types, more per site, more coverage

Rise And Fall of Historical Champion Trackers

Legend:
- come.to
- go.com
- v3.com
- doubleclick.net
- allyes.com
- 2o7.net
- google-analytics.com
- google.com
- quantserve.com
- scorecardresearch.com
- gstatic.com

X-axis: Years (1996–2016)
Y-axis: Coverage (of Top 500)
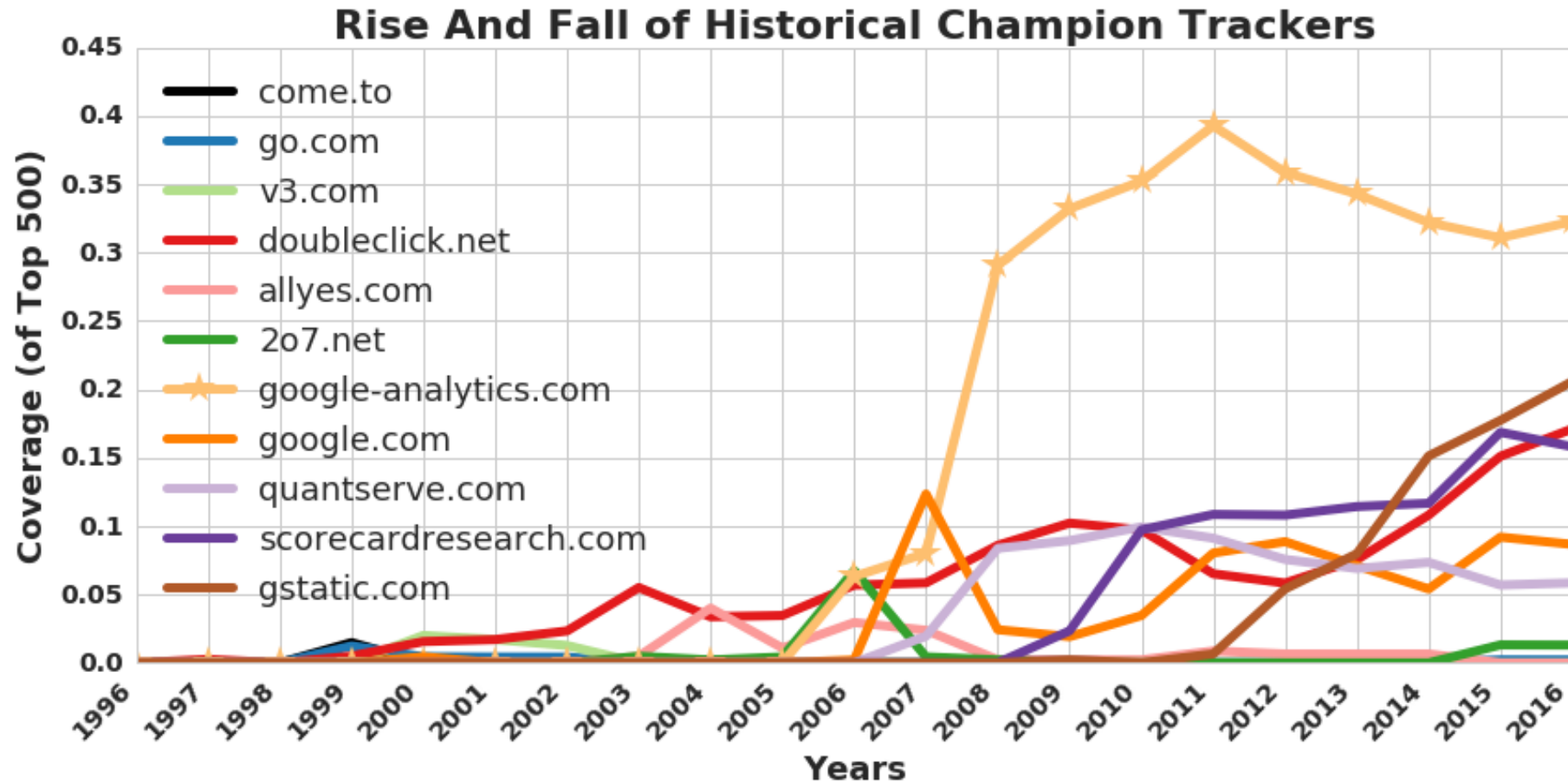
Defenses to Reduce Tracking

- Do Not Track proposal?

Send a 'Do Not Track' request with your browsing traffic

Do Not Track is not a technical defense: trackers must honor the request.

Defenses to Reduce Tracking

- Do Not Track proposal?

- Private browsing mode?

Mostly protects against local, not network, attackers.

You've gone incognito

Now you can browse privately, and other people who use this device won't see your activity. However, downloads and bookmarks will be saved. Learn more

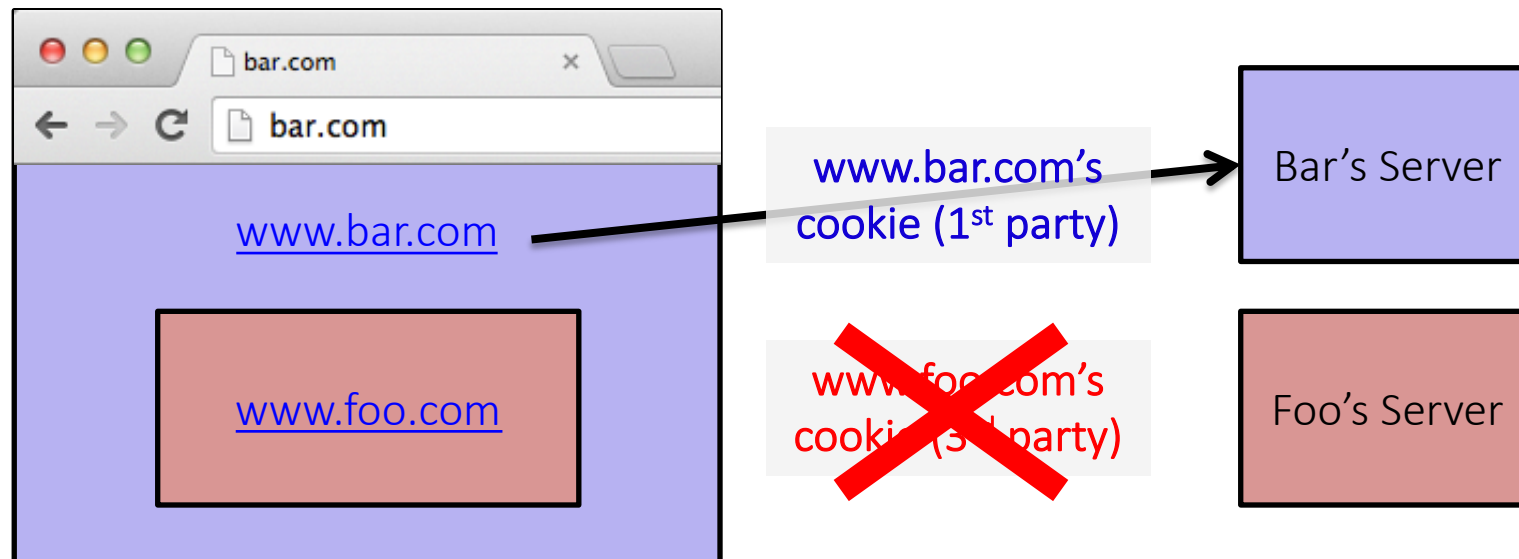Chrome **won't save** the following information:
- Your browsing history
- Cookies and site data
- Information entered in forms

Your activity **might still be visible** to:
- Websites you visit
- Your employer or school
- Your internet service provider

Defenses to Reduce Tracking

- Do Not Track proposal?
- Private browsing mode?
- Third-party cookie blocking?

Cookies

- ◉ Allow local data to be set (recommended)
- ○ Keep local data only until I quit my browser
- ○ Block sites from setting any data
- ☑ Block third–party cookies and site data

[Manage exceptions...] [All cookies and site data...]

bar.com

bar.com

www.bar.com

www.foo.com

www.bar.com's cookie (1st party)

www.foo.com's cookie (3rd party)

Bar's Server

Foo's Server

Quirks of 3ʳᵈ Party Cookie Blocking

Cookies

○ Allow local data to be set (recommended)

○ Keep local data only until I quit my browser

○ Block sites from setting any data

☑ Block third–party cookies and site data
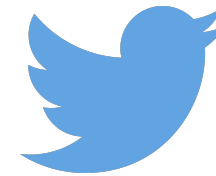
[Manage exceptions…] [All cookies and site data…]

In some browsers, this option meant third-party cookies cannot be set, but they CAN be sent.

So if a third-party cookie was somehow set, it could be used.

How to get a cookie set?

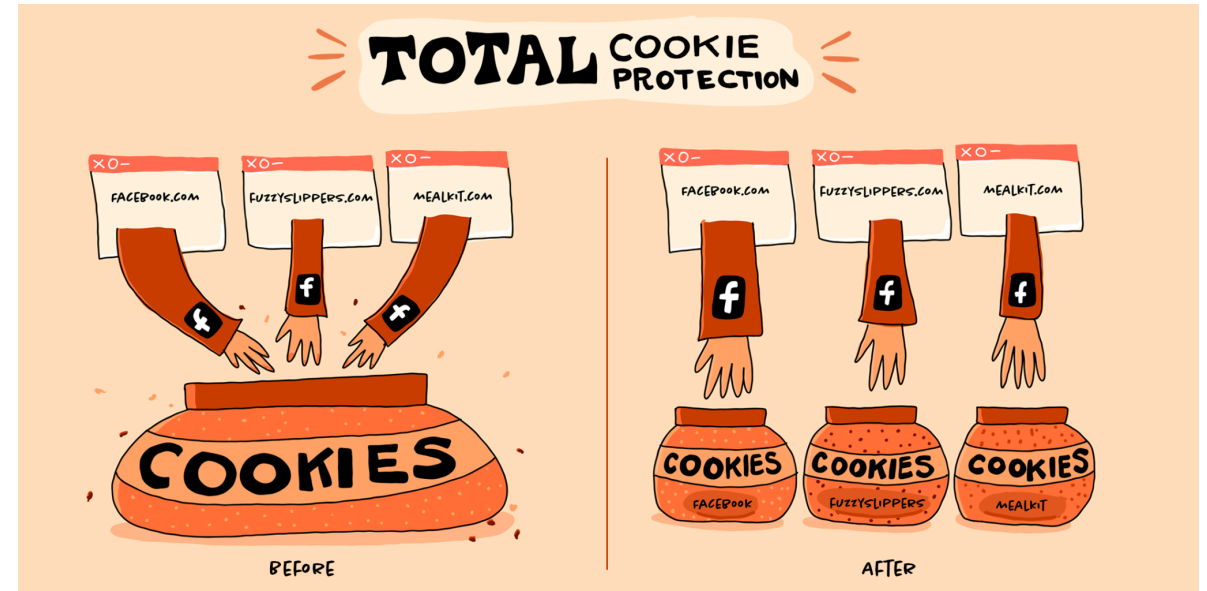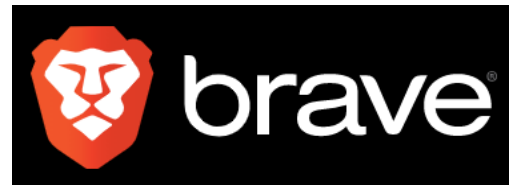One way: be a first party.

etc.

The Death of the Third-Party Cookie

- Essentially no more 3rd party cookies in Firefox or Safari
- Chrome is also moving towards phasing out 3rd party cookies
  - New proposal: "Topics"
  - Lots in flux…

There is still fingerprinting…

What Can Users Do?

- Choice of web browser

- Browser add-ons

uBlock Origin