



# Web Cookies and How to Manage Them

Kay Avila, NCSA

# About NCSA & CSD

- The National Center for Supercomputing Applications (NCSA) at the University of Illinois.
  - Hub of transdisciplinary research and digital scholarship
  - U of I faculty, staff, and students, and collaborators from around the globe
  - Unite to address research grand challenges for the benefit of science and society.
- NCSA is supported by the state of Illinois, the University of Illinois, NSF, and grants from other federal agencies.
- The CyberSecurity Division
  - Researchers, developers, and specialists
  - Advance state of the art of cybersecurity
  - Apply those advances to key science and engineering user communities
  - Provide for the high-performance and security of NCSA's networks and substantial computing resources.



# Web Cookies and How to Manage Them

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Why do kitchen gadgets appear on Facebook after looking up recipes online, or ads for running shoes pop up after searching for new training tips?

How is Amazon able to save items in a virtual shopping cart to be purchased at a later date, or the library's website able to remember log in information so a username and password aren't required each time it's accessed?

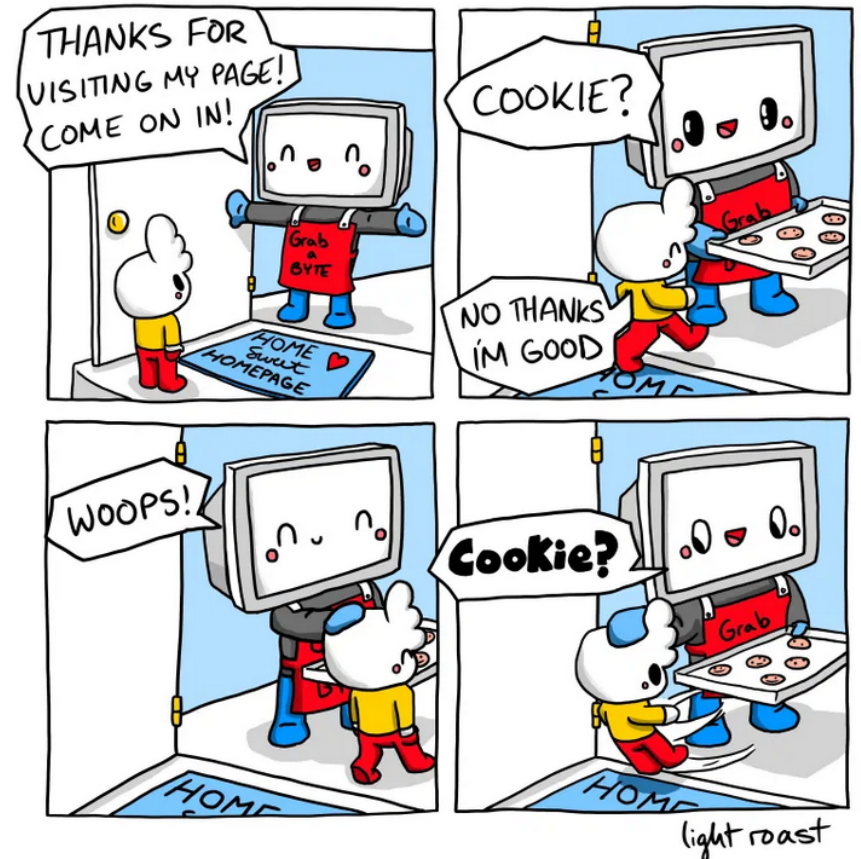
**Web cookies**, aka browser cookies, or HTTP cookies.

# On the Menu for Today

- Web cookies – what they are, how they're used, etc.
- Third party/tracking cookies
- Steps for taking control back and regaining some privacy

# Web Cookies Defined in 60 Seconds

- Short bits of text (“strings”) accumulated on your computer as you browse the web.
- Websites provide them for your browser to store.
- They can serve many purposes -
  - Unique identifiers
  - Storing preferences
  - Session information
  - And of course, for gathering information on you.



# Real-World Cookie Examples

- Cookies come in `name=value` pairs, and they're associated with a particular **domain**.
  - Domains are the middle part of a URL, in bold here: `https://slashdot.org/recent`
- **support.mozilla.org**
  - `geoip_country_code=US`
- **webmail.illinois.edu**
  - `logondata=acc=0&lgn=kayavila`
  - `OutlookSession=81d24d844700d0da9d3f15c8e6d7df7`
- **.doubleclick.net**
  - `IDE=AHWqTUm13zAbQMrzcjx3qFX6QsZzMiiSKhujB-RgMbmE_R4yuiVnvarB53u9MQCn`

# Looking Behind the Scenes at a Web Request

Visiting <http://www.google.com/>

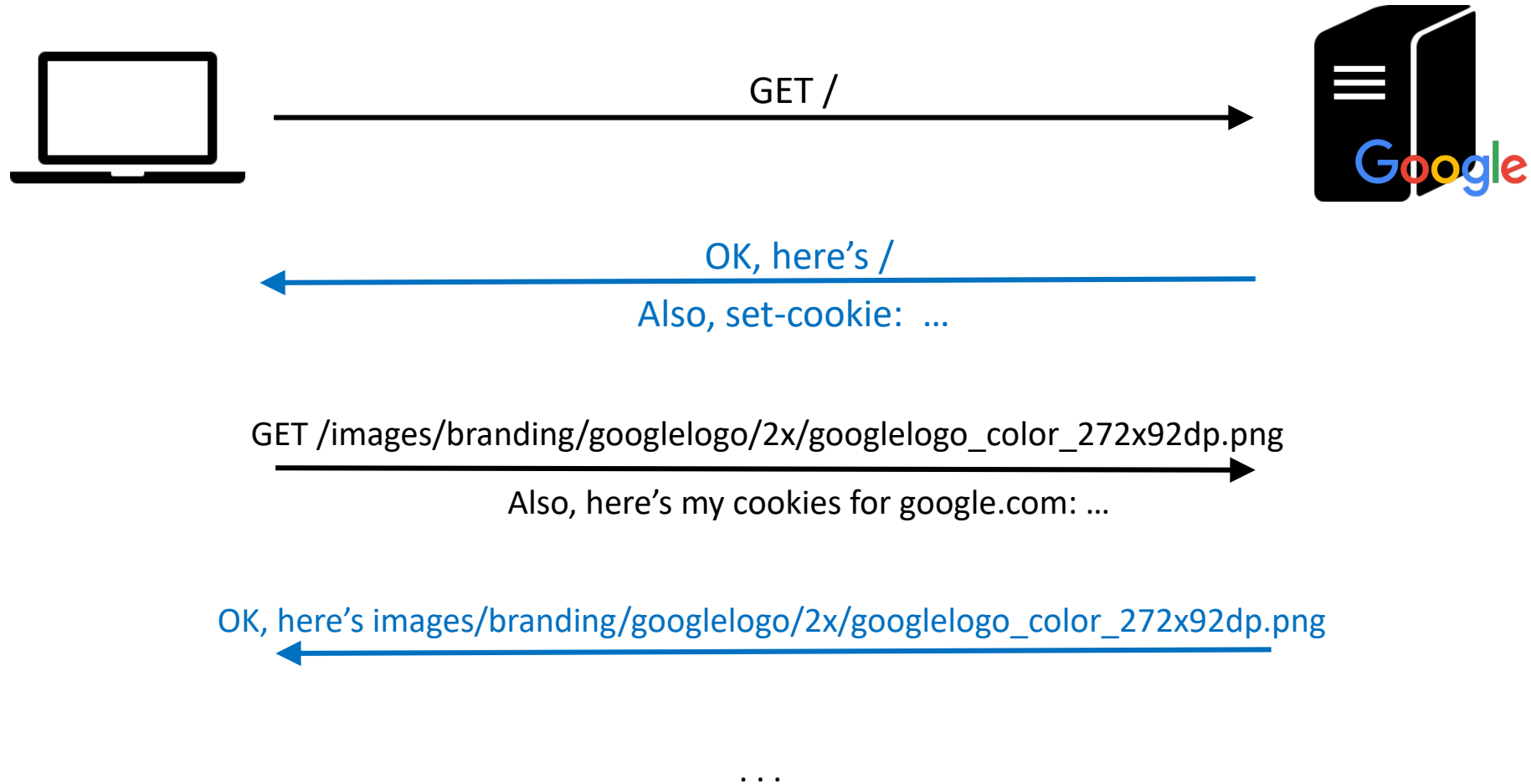


...



# Looking Behind the Scenes at a Web Request, Pt 2

## Visiting <http://www.google.com/>



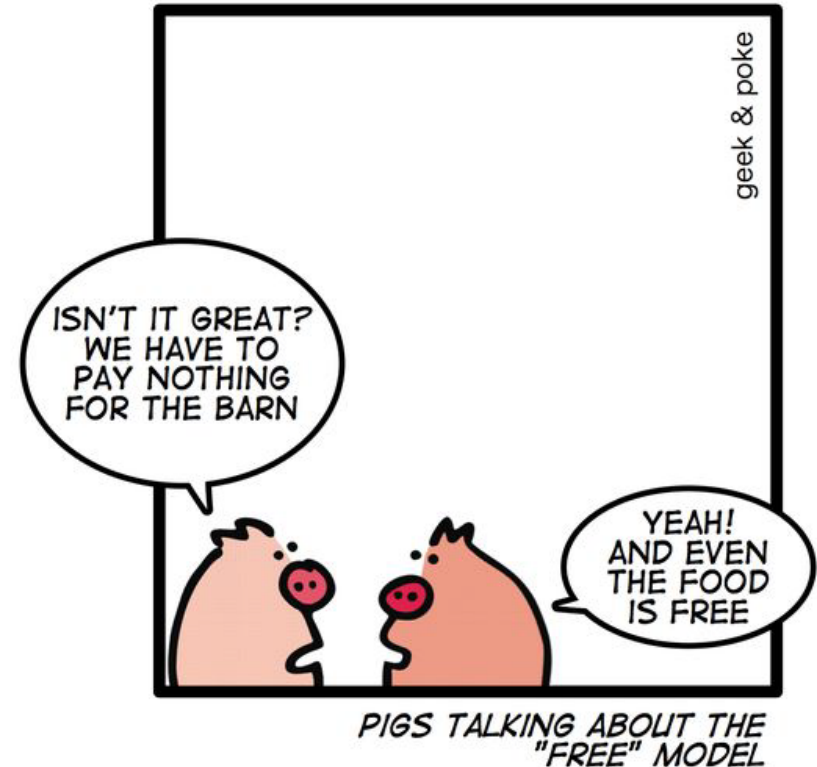
# Demo time!



Viewing cookies with Firefox's Web Developer tool, and  
interacting with [mobile.weather.gov](https://mobile.weather.gov) cookies

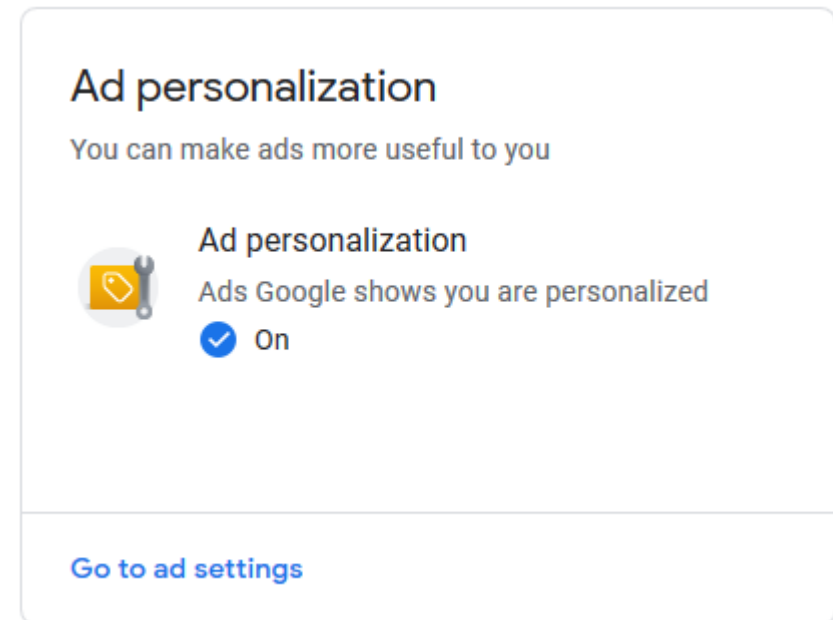
# Tracking Cookies

- First-party versus third-party cookies
- Tracking user behavior
  - Directly – Web servers can log what you accessed on their site and track your behavior.
  - Indirectly – Third-party cookies let a *different* web server track you across multiple sites, in order to learn more about you and your interests.
- “If you aren’t paying for a product, you are the product.”



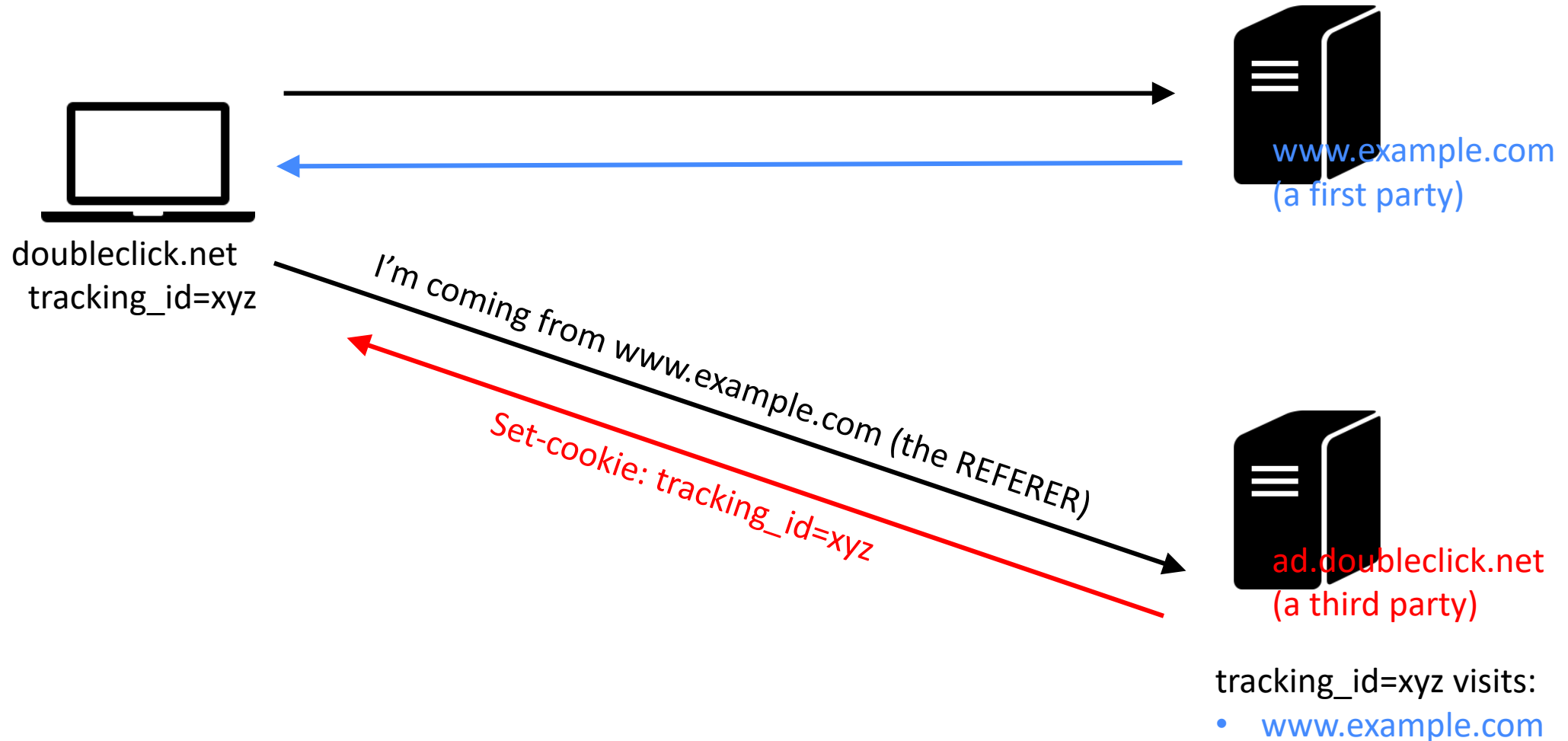
# Cookies versus Ads

- Cookies don't cause ads.
- Cookies allow ads to be more *tailored* based on what marketing companies think they know about you.
- Websites receive money from ad companies to display their ads, and sometimes receive more money if you actually click a link.



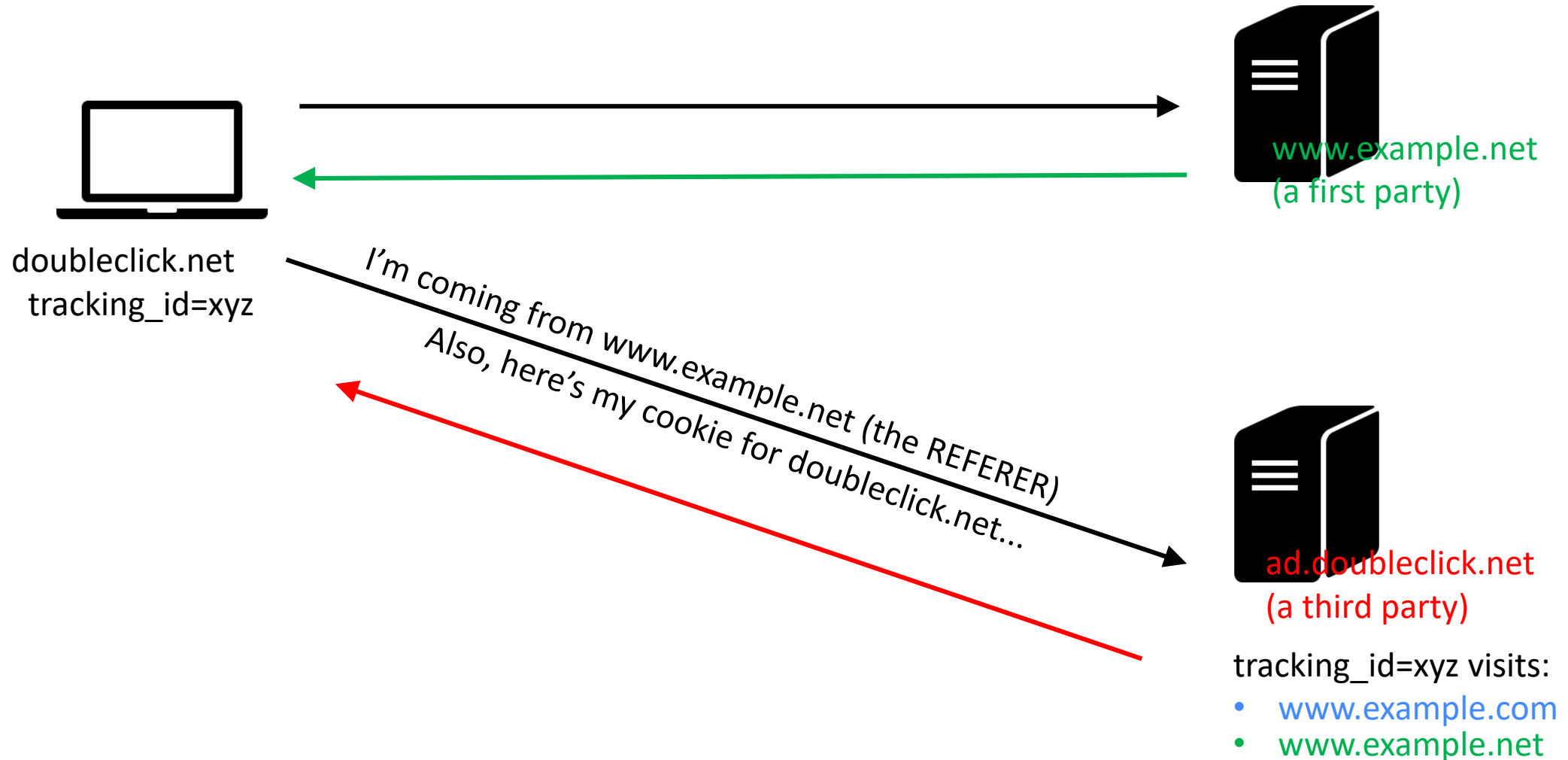
# Looking Behind the Scenes at Tracking Cookies

## Visiting <http://www.example.com/>



# Looking Behind the Scenes at Tracking Cookies

## Visiting <http://www.example.net/>



# Why would the browser visit ad.doubleclick.net?!

- Because example.com and example.net tell it to.
  - Possibly Javascript
  - Or a tiny, tiny image (“pixel”)
- Well, why?
  - Economics: example.com might be getting paid from ad.doubleclick.net to gather information about you and/or to display ads
  - Could happen automatically from just visiting the page, or because you took a specific action (adding an item to the shopping cart, watching a video)
- This is far more pervasive than you might think.

# Demo time!



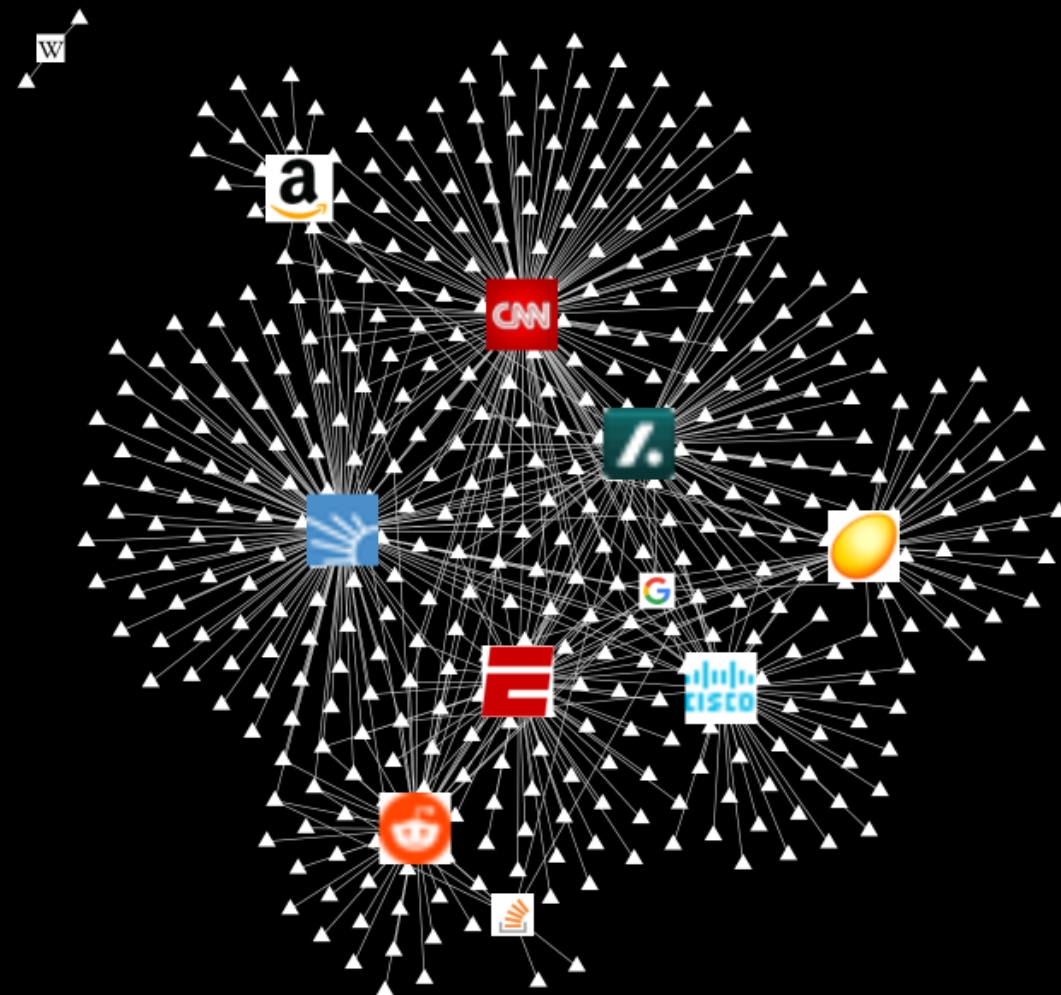
Visualizing third-party cookies with Lightbeam



DATA GATHERED SINCE	YOU HAVE VISITED	YOU HAVE CONNECTED WITH
AUG 12 2020	12 SITES	413 THIRD PARTY SITES

## Recent Site

### GRAPH VIEW



# Google Is a Special Case

- First party cookies:
  - Usage of [www.google.com](http://www.google.com)
  - Google Analytics
- Third party cookies:
  - Google owns doubleclick.net – an ad-serving service
- In some cases, Google will use first and third party cookies to tie together information and gain more information on a user.

## Cookies

__utmc:141335982
__utmt_GSA_CP:1
__utma:141335982.1235022953.1597244681.1597244...
__utmz:141335982.1597244681.1.1.utmcsr=(direct) utmccn=(direct) utmcmd=(none)
__utmb:141335982.2.10.1597244681

(Remember when Google's motto was, "Don't be evil"?)

# What does Google know about you?

## How your ads are personalized

Ads are based on personal info you've added to your Google Account, data from advertisers that partner with Google, and Google's estimation of your interests. Choose any factor to learn more or update your preferences. [Learn how to control the ads you see](#)



35-44 years old



Business Services



Colleges & Universities



Company Size: Large Employer (1k-10k Employ...



Computer & Video Games



Computers & Electronics



Education Status: High School Graduate



Enterprise Technology



Home & Garden



Homeownership Status: Homeowners



Household Income: Upper Middle



Marital Status: Married



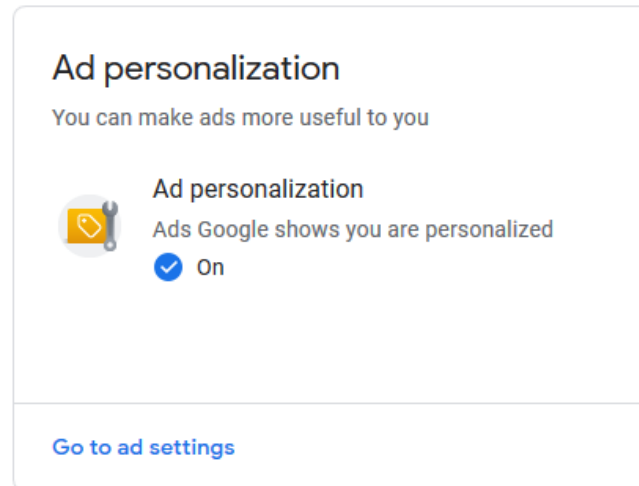
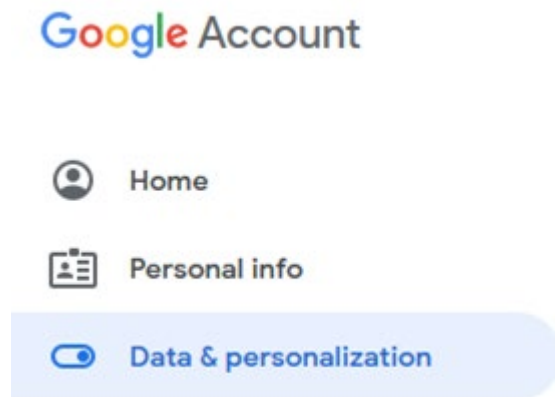
Parental Status: Not A Parent



Pet Food & Pet Care Supplies

# Taking Back Control – Low Risk Steps

- Install an extension that blocks tracking cookies from being accepted by your browser
  - uBlock Origin (also blocks some ads), Disconnect, Privacy Badger, etc.
- Update your Google ad preferences at <https://myaccount.google.com/>



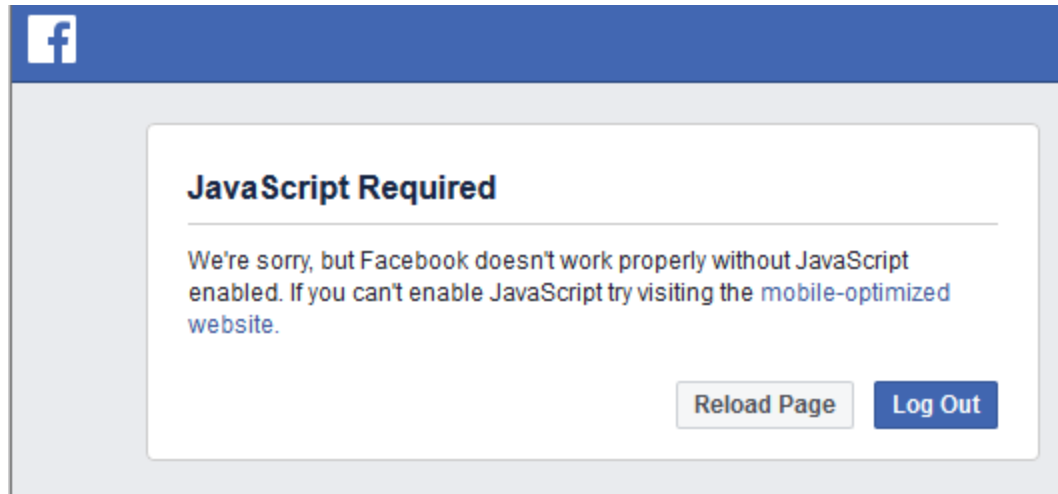
# Taking Back Control – Medium Steps

- Set your browser to reject third-party cookies.
  - This may (rarely) break functionality on some websites.
- Update your browser to delete all cookies on close.
  - Without cookies, your session information will be lost – i.e. you'll be logged out of all websites.



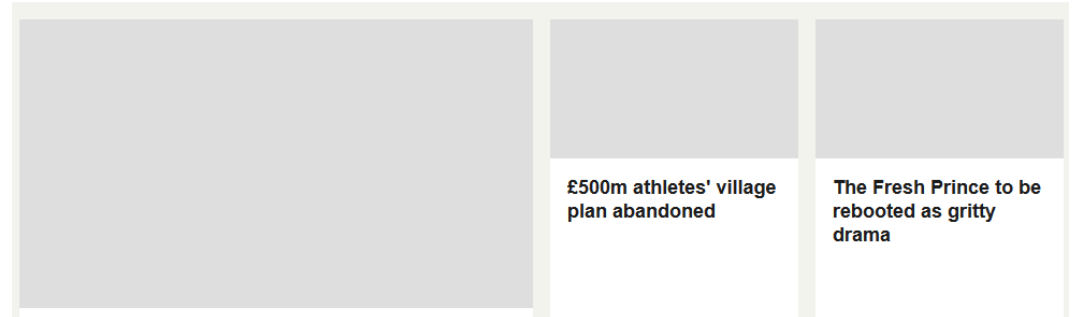
# Taking Back Control – Expert Level Steps

- Disable Javascript. Enjoy breaking your Internet experience!
  - Usually done through an extension: NoScript, uMatrix, ScriptBlocker, etc.



Welcome to the BBC

Tuesday, 11 August



We've detected that JavaScript is disabled in your browser. Would you like to proceed to legacy Twitter?

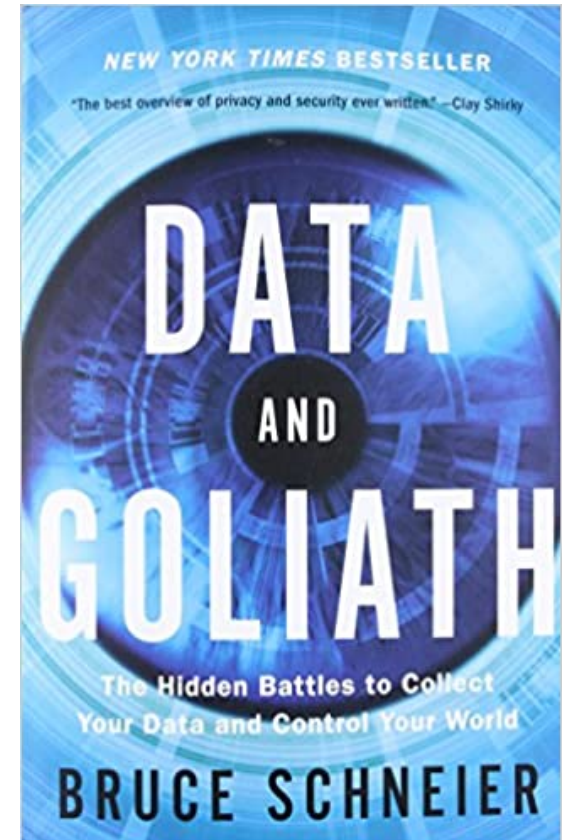
Yes

# Conclusions

- Cookies aren't an inherently "evil" technology. They can be used in ways to enhance the web browsing experience, as well as to track you in ways you might find invasive.
- You're probably being tracked a lot more than you realize...
- ... but there are steps you can take to decrease this.
- Unfortunately, the arms race between privacy advocates and marketing companies continues.

# For More Information...

- About the underlying technology:
  - <https://blog.treasuredata.com/blog/2017/02/03/cookies-101-how-user-tracking-works/>
  - <https://blog.treasuredata.com/blog/2017/02/16/whats-3rd-party-cookie-and-how-is-it-used-to-track-users/>
  - <https://adquadrant.com/what-is-a-tracking-pixel/>
  - <https://www.comparitech.com/identity-theft-protection/supercookie/>
  - <https://smallbusiness.chron.com/happens-delete-cookies-52972.html>
- Impact analyses with commentary:
  - <https://www.theatlantic.com/technology/archive/2012/02/im-being-followed-how-google-151-and-104-other-companies-151-are-tracking-me-on-the-web/253758/>
  - Data and Goliath: The Hidden Battles to Collect Your Data and Control Your World by Bruce Schneier







# Thank you for attending!

## Questions?

- Blog post with slides and video:
  - <https://wiki.ncsa.illinois.edu/x/PwCZBw>
- Website: [security.ncsa.illinois.edu](https://security.ncsa.illinois.edu)
- Twitter: [@NCSASecurity](https://twitter.com/NCSASecurity)