

# Lecture 7: Privacy

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CS 5431

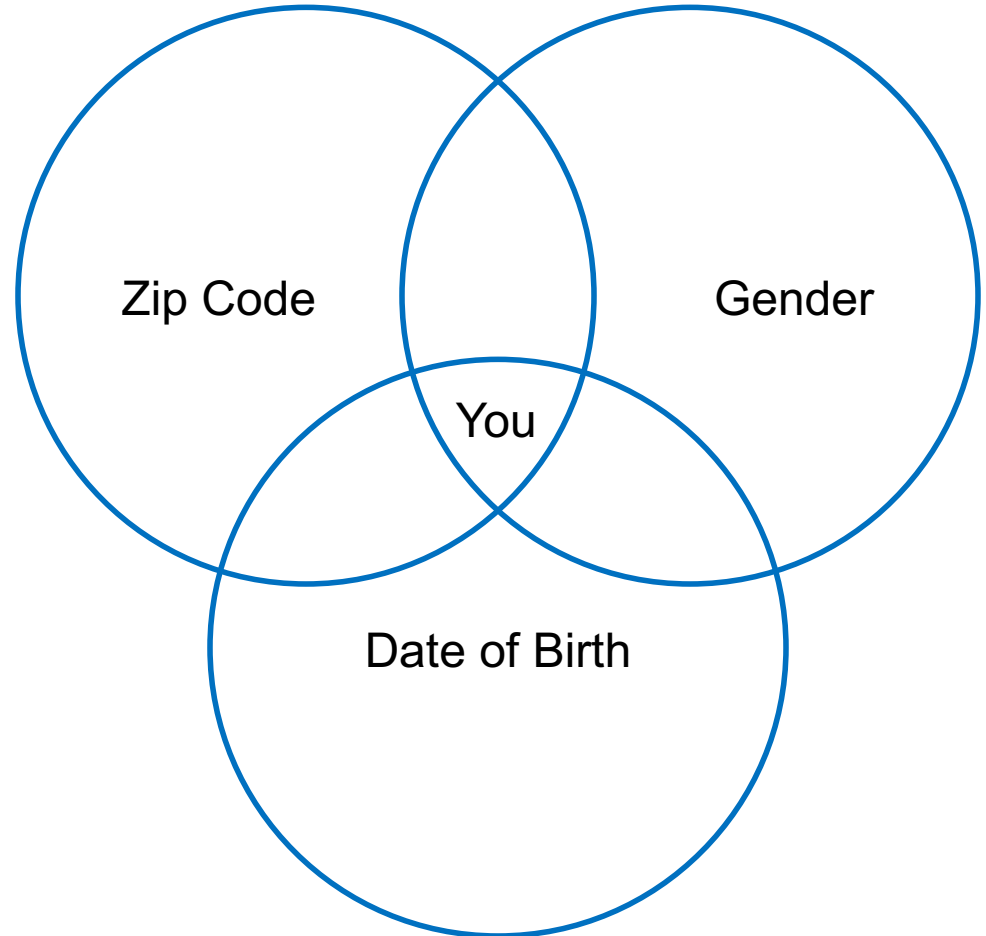
3/24/2017

# What is Privacy?



# General Guidelines

- Seek consent
- Minimize data use
- Limit storage
- Avoid linking



# Deanonymization

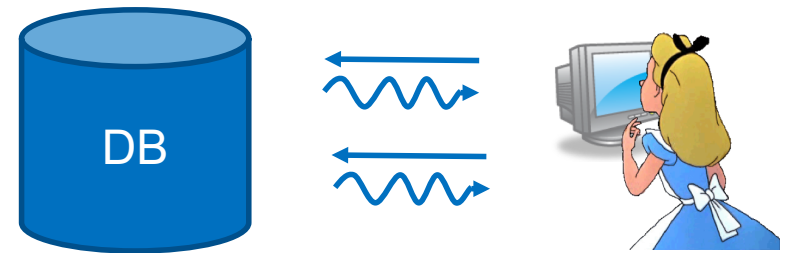
The Netflix logo, consisting of the word "NETFLIX" in white, bold, sans-serif capital letters with a black drop shadow, centered on a solid red rectangular background.

# Database Privacy

## Offline Privacy



## Online Privacy



# k-Anonymity

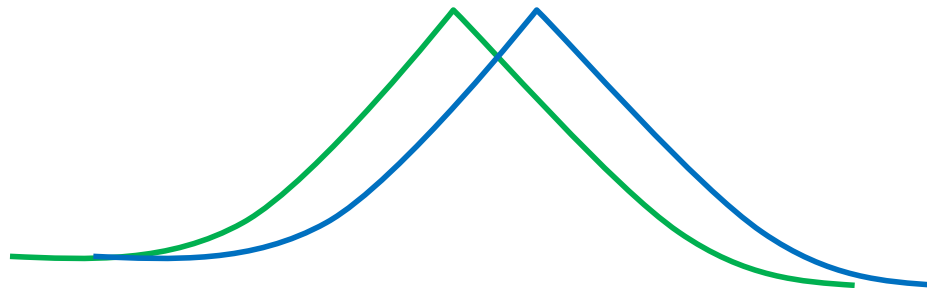
Name	Gender	Year	Grade
Alice	F	2018	95
Bob	M	2018	80
Charlie	M	2018	95
David	M	2018	60
Edward	M	2017	80
Flora	F	2017	99
Georgia	F	2017	60

# Data Perturbation

[illegible]

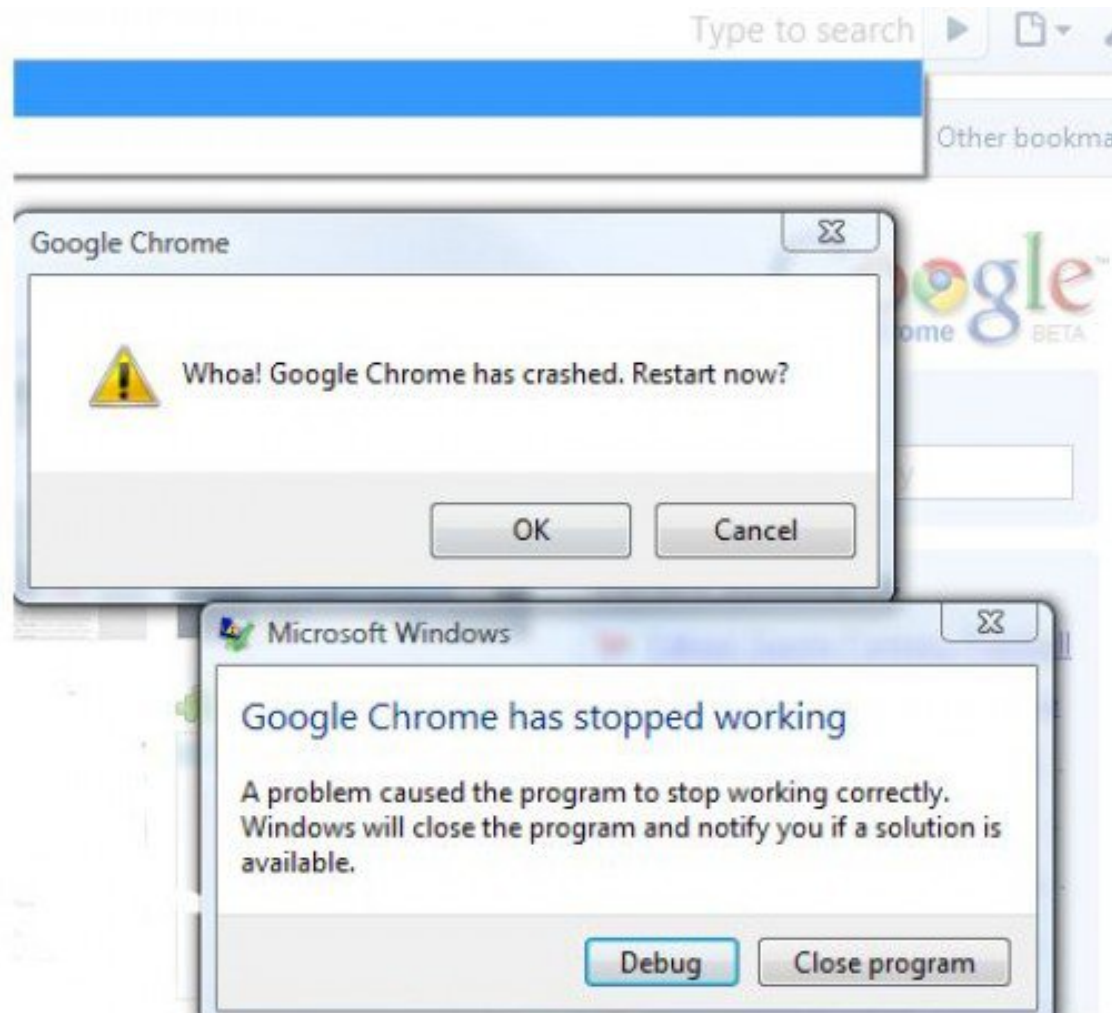
# Differential Privacy

Key Idea: Changing a single user's record does not significantly affect the result of any analysis or query

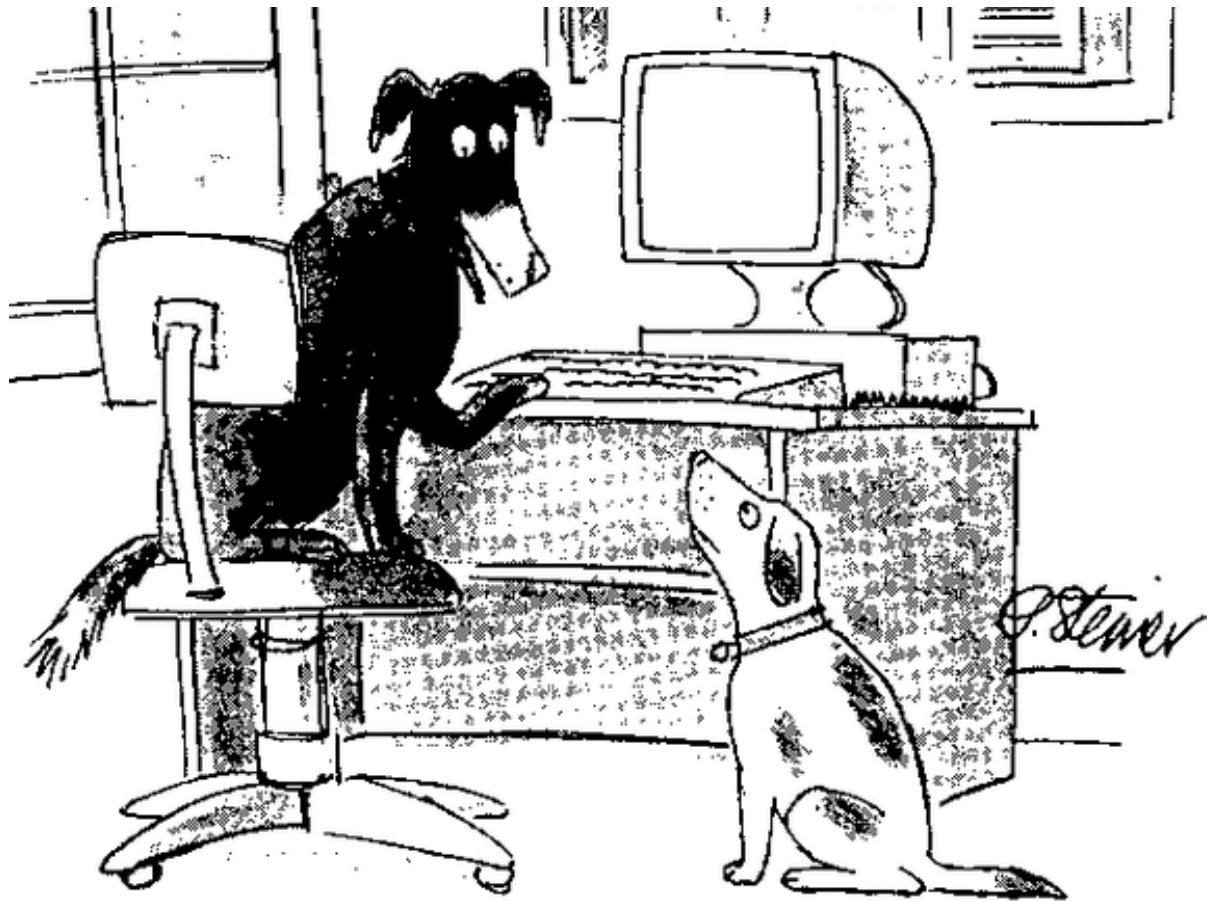




# DP in action...



# Internet Privacy



*"On the Internet, nobody knows you're a dog."*

# Internet Privacy

The Joy of Tech™



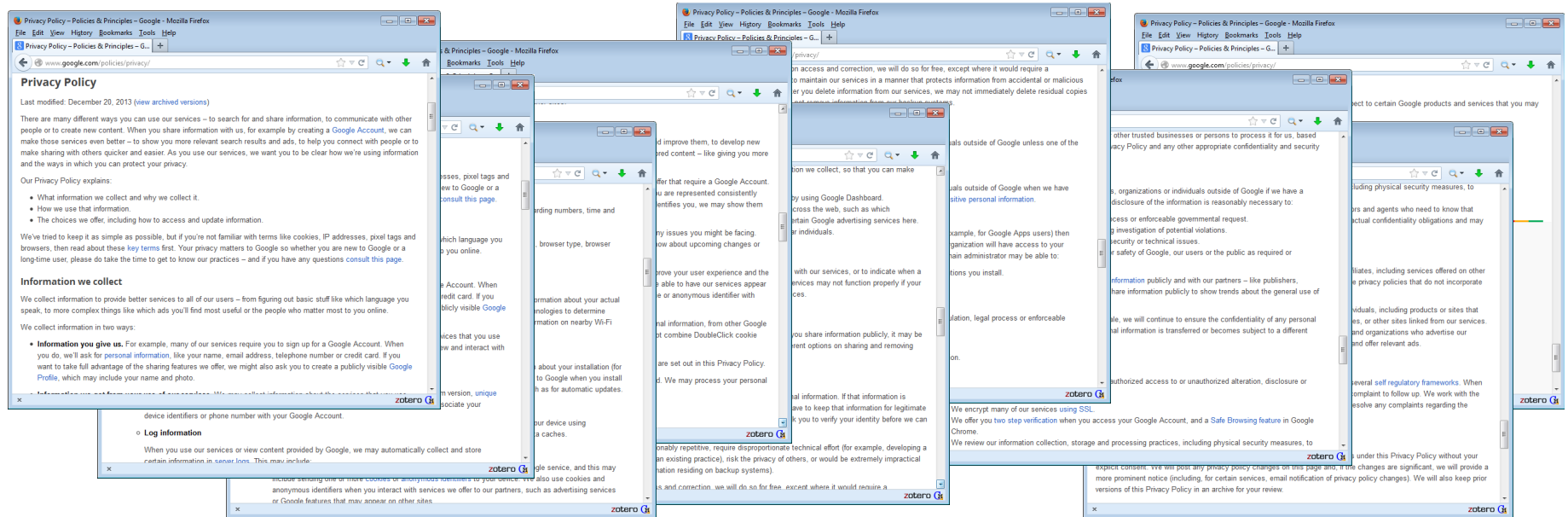
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joyoftech.com

# Notice & Consent



# Browser Tracking

 DATA CENTER SOFTWARE SECURITY TRANSFORMATION DEVOPS BUSINESS PERSONAL TECH SCIENCE EMERGENT TECH BOOTNOTES



## Personal Tech

### US Senate votes to let broadband ISPs sell your browser histories

Hear that? That's the sound of ringing tills, sorry, freedom



23 Mar 2017 at 19:23, [Kieren McCarthy](#)



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Privacy



阿里云国际站正  
式上线

美国、香港、新加坡、中国等  
全球覆盖. 全球统一账号, 体



# Browser Tracking



# Browser Tracking

SECTIONS

SEARCH

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abirrell

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Search

Elements Network Resources Timelines Debugger Storage Console

All Resources Documents

Name	Domain	Met...	Sch...	Status	Cac...	Size	Transfer...	Start Time	Latency	Duration
blob:https://www.youtube.com/8a5f55e3-99f3-...	a1.nyt.com	GET	HTTPS	200	Yes	437.57 KB	0 B	311.1ms	19.79ms	149.2ms
tagx-simple.min.js	a248.e.akamai.net	GET	HTTPS	200	Yes	32.56 KB	0 B	7.60s	24.03ms	0.154ms
sharetools-mixin.js	ad.doubleclick.net	GET	HTTPS	200	No	42 B	559 B	18.93s	62.15ms	0.911ms
sharetools-config.js	ad.doubleclick.net	GET	HTTPS	200	No	42 B	559 B	17.20s	244.0ms	0.839ms
showwall.js	ad.doubleclick.net	GET	HTTPS	200	No	42 B	559 B	5.23s	125.5ms	0.658ms
sharetools.js	ads.undertone.com	GET	HTTPS	200	No	7 B	129 B	9.68s	1.09s	0.249ms
fonts.css	ag.innovid.com	GET	HTTPS	200	No	43 B	288 B	9.69s	996.8ms	1.076ms
ad-view-manager.js	analytics.twitter.com	GET	HTTPS	200	No	—	604 B	7.17s	1.14s	0.425ms
1.6.0.js	beacon.krxd.net	GET	HTTPS	204	No	—	491 B	9.62s	2.13s	5.757ms

Filter Resource List

Main Frame

# Beyond Cookies

## Zombie Cookies

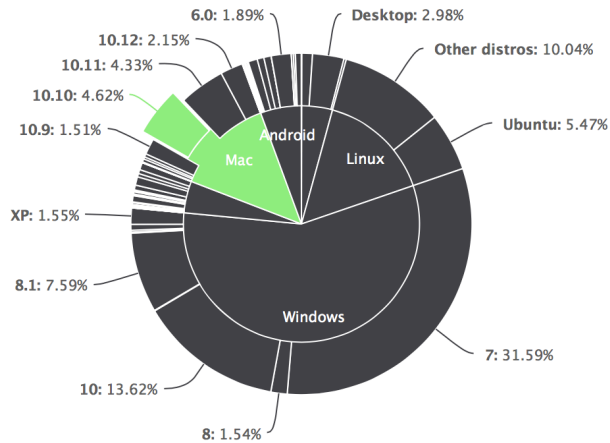


## Browser Fingerprinting

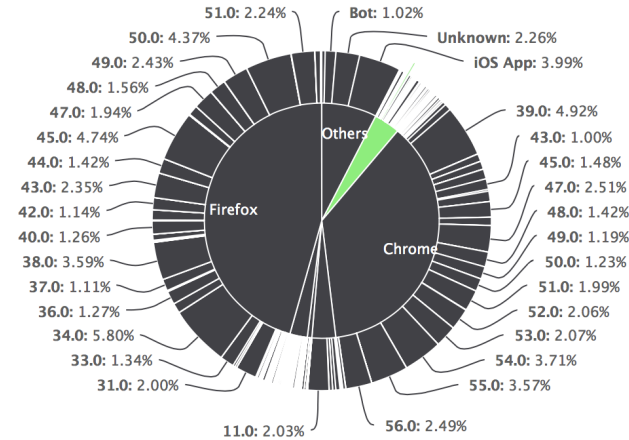




# Fingerprinting Works



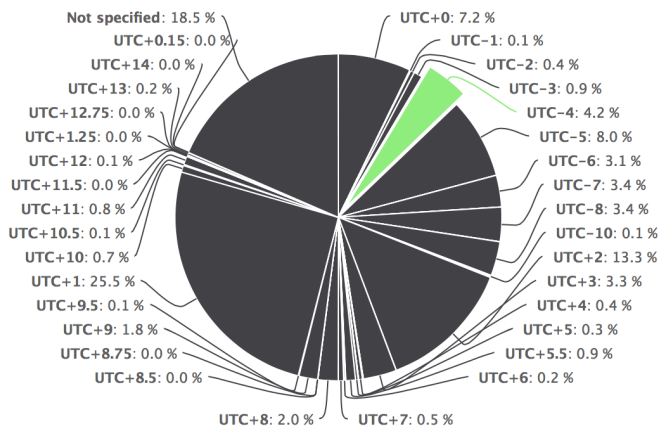
Operating System



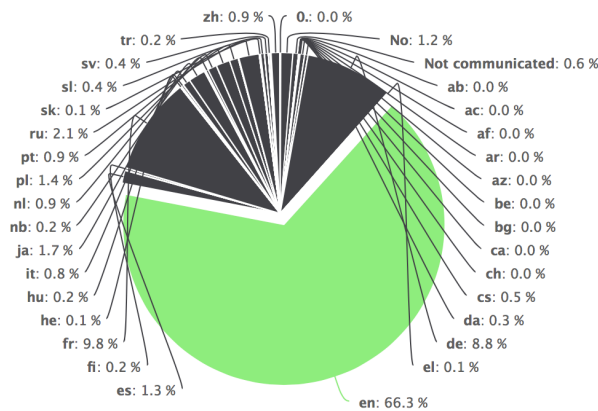
Browser

Cookies enabled ⓘ	77.92%	"yes"
Do Not Track ⓘ	30.91%	"yes"
Timezone ⓘ	4.23%	"240"
Screen resolution ⓘ	3.63%	"1280x800x24"
Use of local storage ⓘ	74.40%	"yes"
Use of session storage ⓘ	74.40%	"yes"

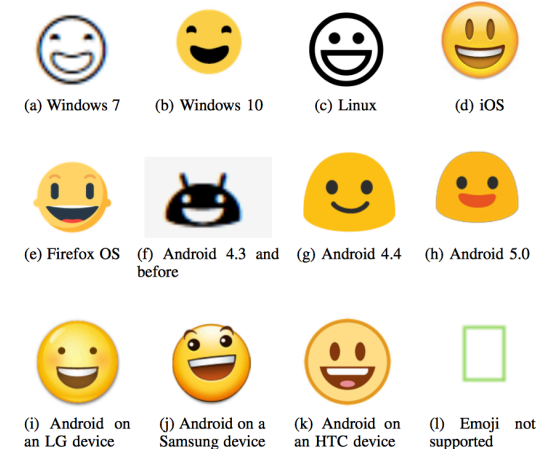
Settings



Time Zone



Language



Canvas

# The result...

## Your categories

Below you can review the interests and inferred demographics that Google has associated with your cookie. You can [remove](#) or [edit](#) these at any time.

Business & Industrial

Business & Industrial - Manufacturing

Computers & Electronics - Computer Hardware - Laptops & Notebooks - Tablet PCs

Computers & Electronics - Software - Multimedia Software - Photo & Video Software

Computers & Electronics - Software - Operating Systems - Mac OS

Internet & Telecom - Mobile & Wireless - Mobile Phones

Internet & Telecom - Mobile & Wireless - Mobile Phones - Smart Phones

Online Communities - Social Networks

Reference - General Reference - Time & Calendars

Science - Mathematics

# Personalized Content



# Targeted Advertising





# Data Collection is Here to Stay...



*"Remember when, on the Internet, nobody knew who you were?"*