No boundaries: Exfiltration of personal data by session-replay scripts

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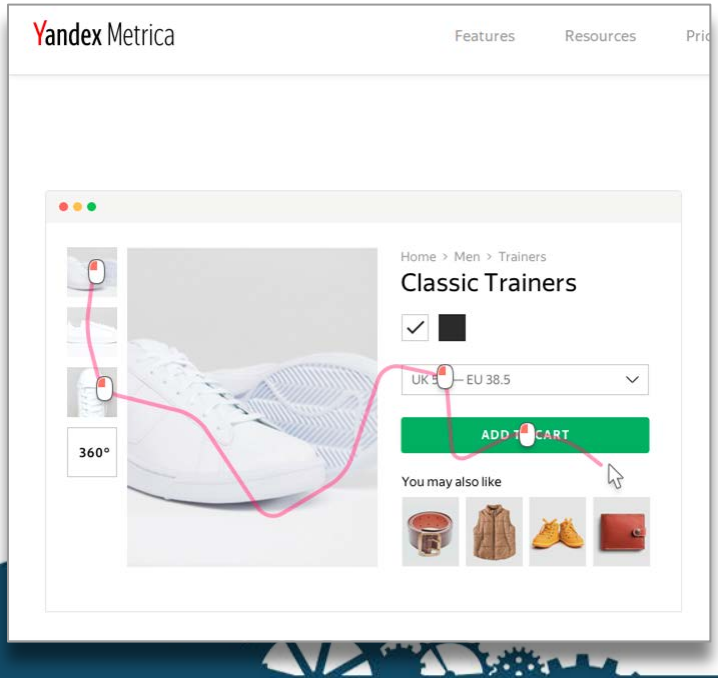
Photo: Dan Saelinger (Prop Stylist: Dominique Baynes)
https://spectrum.ieee.org/computing/software/browser-fingerprinting-and-the-onlinetracking-arms-race

What are session replay scripts?

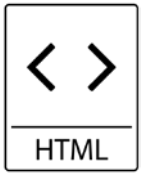
“Watch recordings of your visitors’ sessions. Discover how they browse as if you're looking over their shoulder!” (clicktale.com)

Why use session replay scripts?



- Who are my most valuable customers?
- Who added items to the cart but didn’t convert?
- Where are users frustrated?

The problem: recordings require a ton of data



Full page source and text

Mouse movements & clicks

Keypresses

Automated redaction...

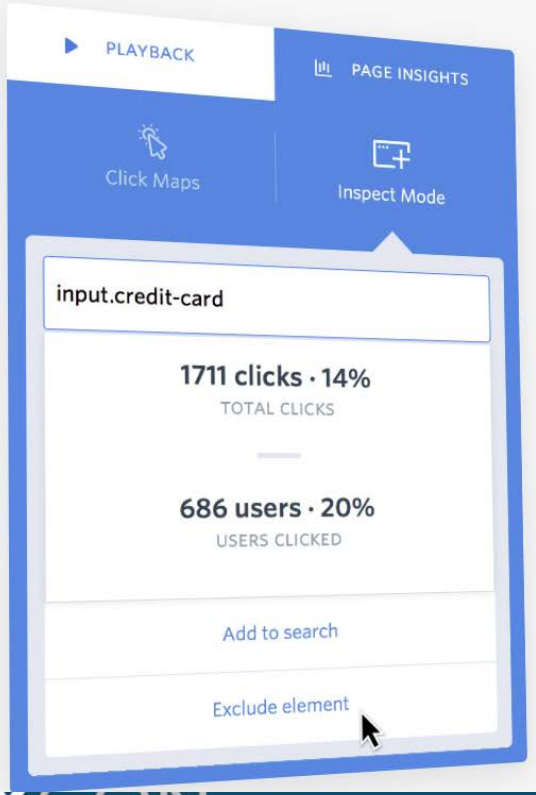
Excluded Elements

Enter CSS selectors on separate lines, describing elements to be excluded from capture. Learn more

```
input[type="password"]
[autocomplete="cc-name"]
[autocomplete="cc-given-name"]
[autocomplete="cc-additional-name"]
[autocomplete="cc-family-name"]
[autocomplete="cc-number"]
[autocomplete="cc-exp"]
[autocomplete="cc-exp-month"]
[autocomplete="cc-exp-year"]
[autocomplete="cc-csc"]
[autocomplete="cc-type"]
```

Redacted Field	FullStory	UserReplay	SessionCam	Hotjar	Yandex	Smartlook
Name	○	◐	◐	○	○	○
Email	○	◐	◐	○	○	○
Phone	○	◐	◐	○	○	○
Address	○	◐	◐	○†	○	○
SSN	○	◐	◐	○	○	○
DOB	○	◐	◐	○	○	○
Password	●	◐	●	●	●	◐
CC Number	●	◐*	◐	◐	○	●
CC CVC	●	◐	◐	○	○	●
CC Expiry	●	◐	◐	○	○	●

Manual redaction



Easily protect your user's privacy.

Exclude sensitive customer data from ever leaving your customer's browser by using our in-app point and click system.

How can things go wrong?

We found session recordings containing:

Passwords
(*Propeller Ads*, …)

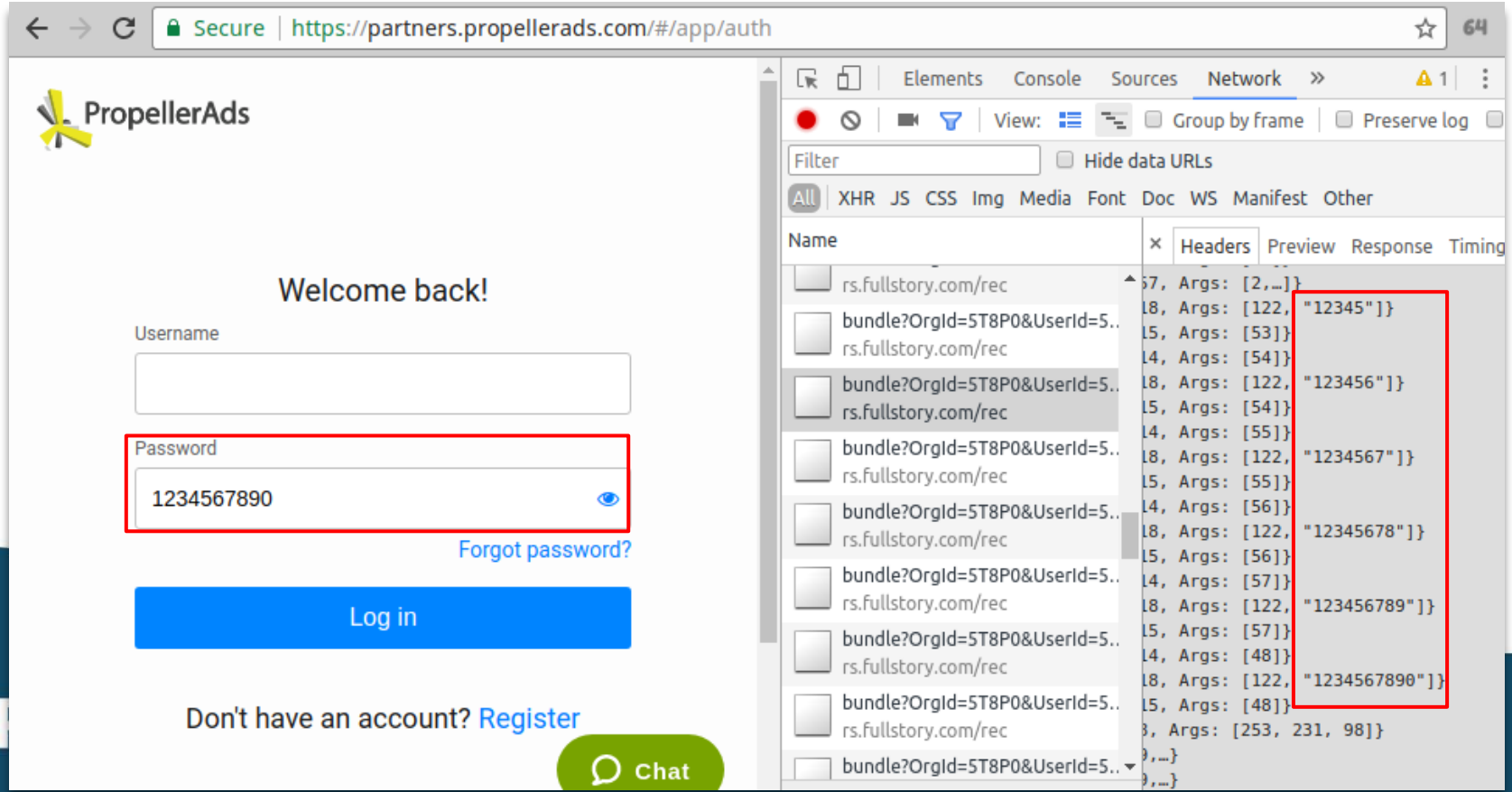
Credit Card details
(Bonobos)

Student data
(Gradescope)

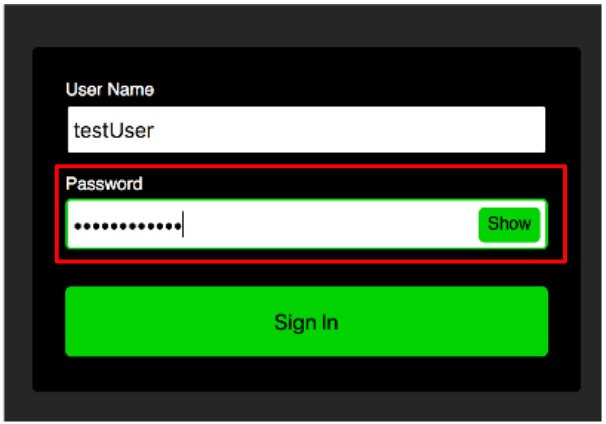
Health data
(Walgreens)

Purchase details
(Lenovo)

Passwords leak to Fullstory on PropellerAds



Filter bypass due to unexpected input types



`<input type="password">`

(automatically redacted with [type="password"] rule)

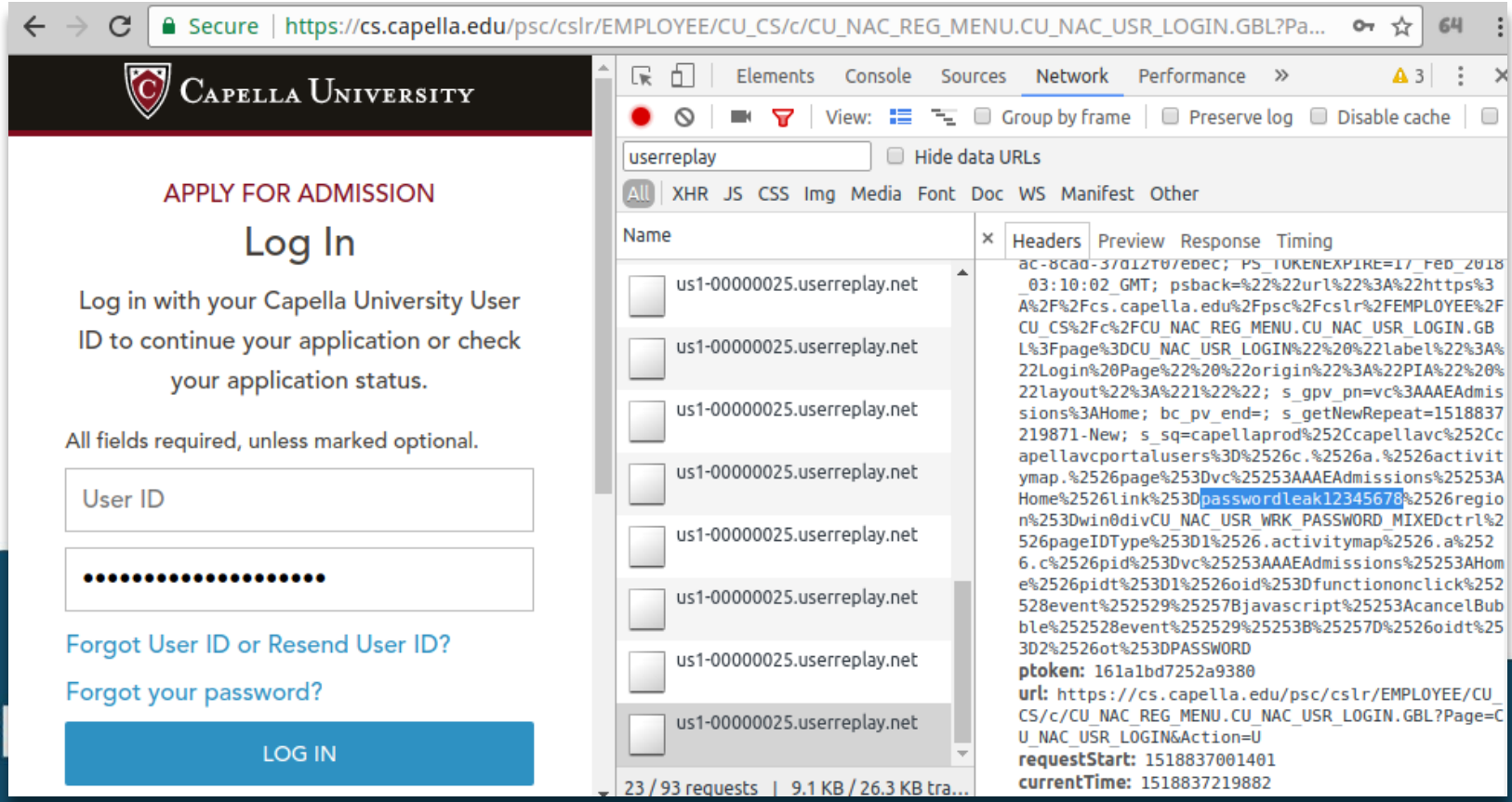
Show password clicked...

`<input type="text">`

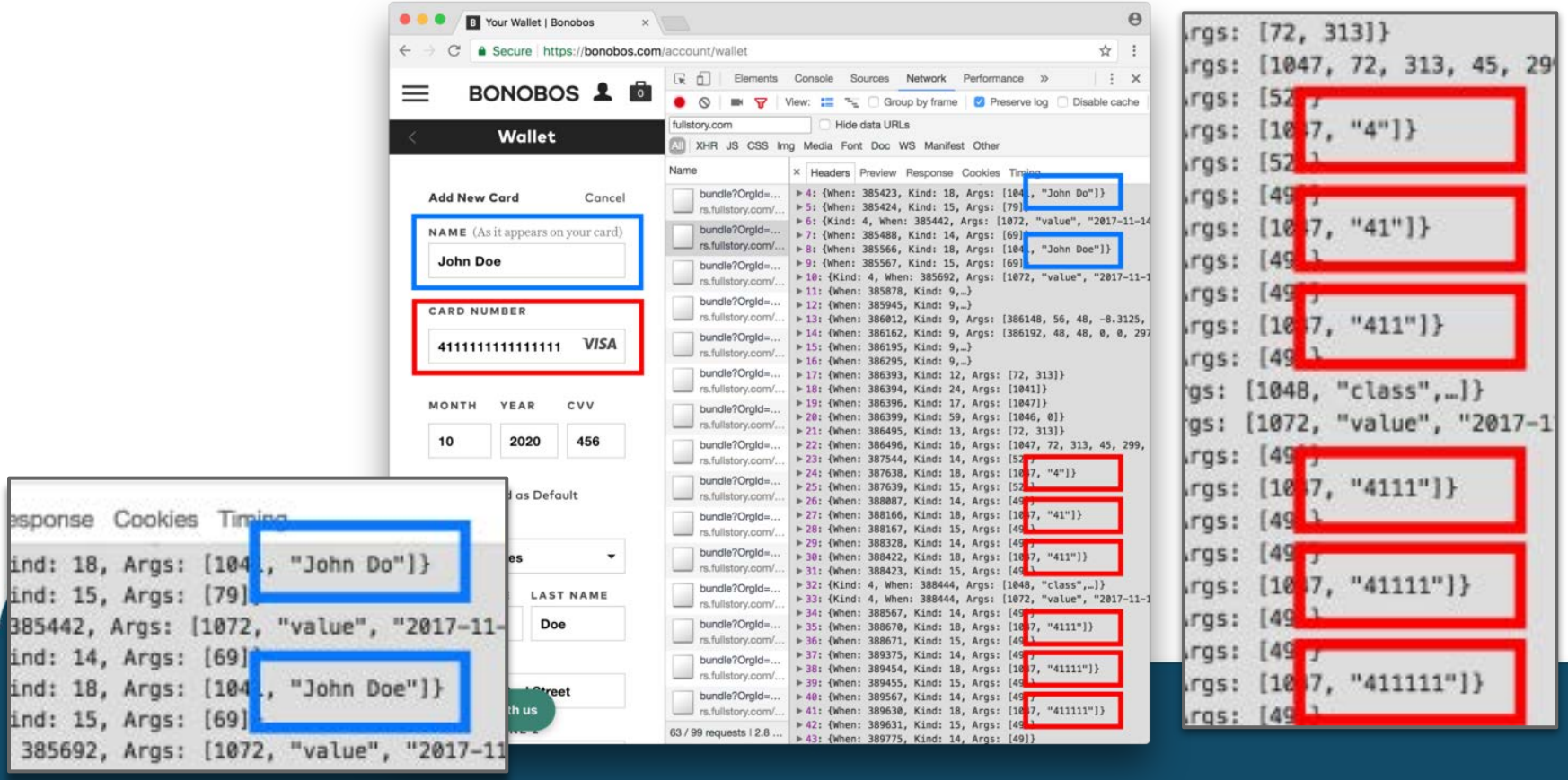
(automatic redaction fails)

Demo from: https://codepen.io/geoffreyrose/pen/HKDkB

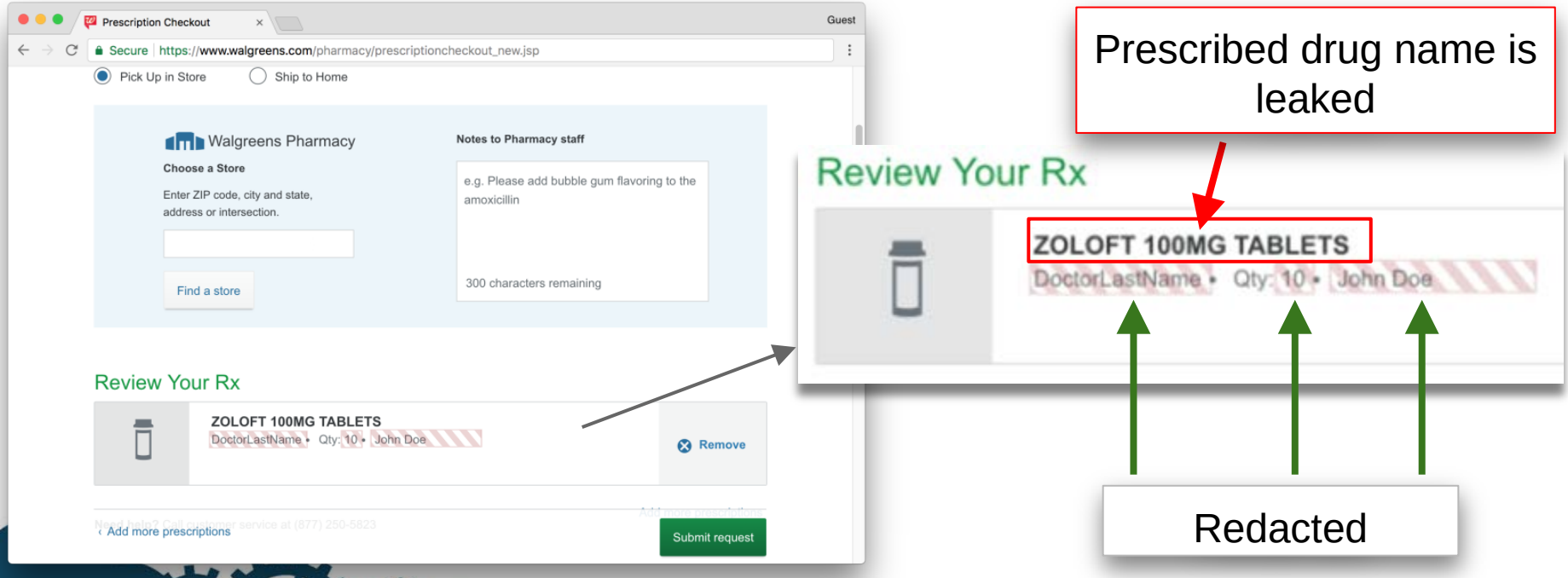
Passwords leak to Userreplay on Capella University



CC#, CVV and name leak to Fullstory on Bonobos



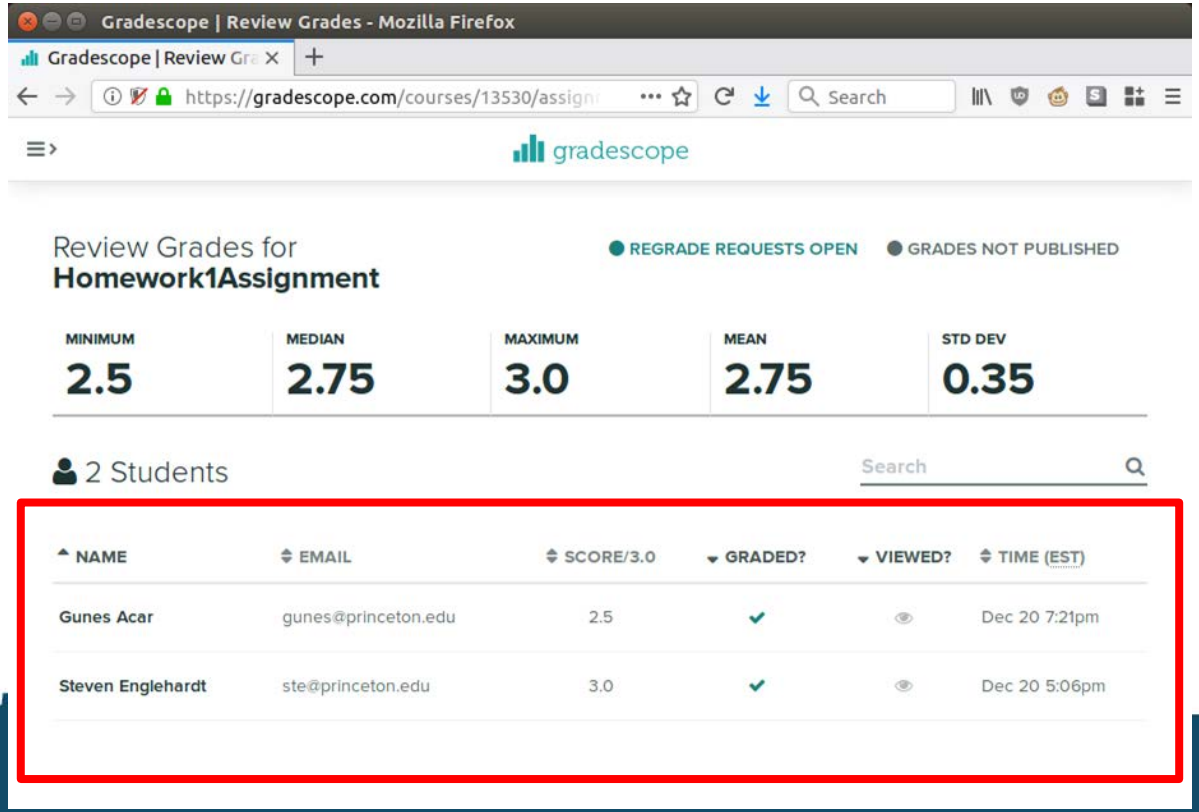
Prescription details leak to Fullstory on Walgreens



Student details leak to Fullstory on Gradescope

Recordings included:

- Student names
- Student emails
- Student grades
- Professor comments



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Session recordings are widespread

- 14+ analytics company offer recording services
  - Present on 99,174 of the top 1 million sites
- Evidence of recording on 7,918 sites.
  - Likely a lower bound as recording scripts sample users

Session recording present on ~1 - 10% of the top 1 million sites. We found several severe PII leaks after manually reviewing ~30 sites.

→ **How many more leaks are out there?**

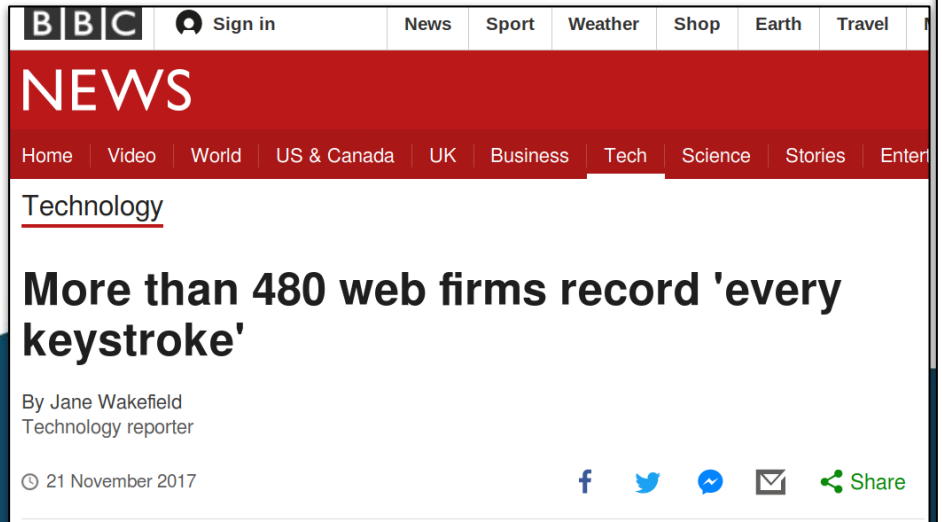
Takeaways

- Recordings contain sensitive information
  - incl. HIPAA, FERPA protected data
- Redaction is difficult and brittle
- Are users comfortable being watched?

Needing to ask “Is this legal?” should give you pause.

Updates

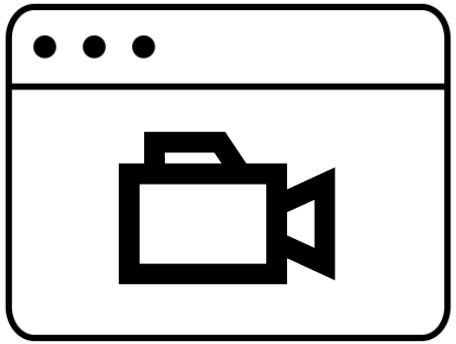
- Walgreens, Gradescope and Bonobos removed session replay script



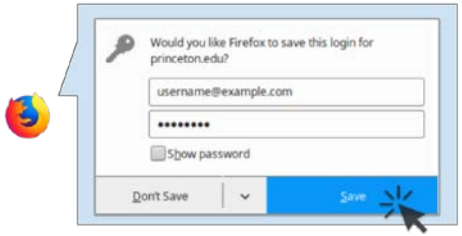
No boundaries series: Privacy vulnerabilities arising from directly embedded third parties

https://freedom-to-tinker.com/tag/noboundaries/

Session Replay



Autofill abuse



And more....

“No boundaries: Exfiltration of personal data by session-replay scripts” (freedom-to-tinker.com)
“No boundaries for user identities: Web trackers exploit browser login managers” (freedom-to-tinker.com)

Thanks for listening!

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Blog post: https://freedom-to-tinker.com/2017/11/15/no-boundaries-exfiltration-of-personal-data-by-session-replay-scripts/

No boundaries series: https://freedom-to-tinker.com/tag/noboundaries/

Princeton Web Transparency & Accountability Project: https://webtap.princeton.edu/

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