How security affects the people behind the code

Dr. Philippe De Ryck

https://Pragmatic Web Security.com

Dr. Philippe De Ryck

- Deep understanding of the web security landscape
- Google Developer Expert (not employed by Google)
- Course curator of the SecAppDev course (https://secappdev.org)

Pragmatic Web Security

High-quality security training for developers and managers

Custom courses covering web security, API security, Angular security, …

Consulting services on security, OAuth 2.0, OpenID Connect, …

@PhilippeDeRyck

https://PragmaticWebSecurity.com

Have you ever felt unappreciated trying to get security right?

21 MAR 19

Facebook Stored Hundreds of Millions of User Passwords in Plain Text for Years

Hundreds of millions of **Facebook** users had their account passwords stored in plain text and searchable by thousands of Facebook employees — in some cases going back to 2012, KrebsOnSecurity has learned. Facebook says an ongoing investigation has so far found no indication that employees have abused access to this data.

Philip McHugh
@PhilipMcHugh_IE

Replying to @briankrebs

I would of been surprised if it was salted 😏 but yea, big user base storing plain text passwords, come on, really 😕

4:25 PM · Mar 21, 2019 · Twitter for Android

1 Retweet **1** Like

♠Calamity♠
@TenCentsIsFree

Replying to @joemccann

Even the best have lazy developers 😄

5:09 AM · Mar 22, 2019 · Twitter for Android

Twitter advising all 330 million users to change passwords after bug exposed them in plain text

There's apparently no evidence of any breach or misuse, but you should change your password anyway

By Chaim Gartenberg | @cgartenberg | May 3, 2018, 4:21pm EDT

GitHub says bug exposed some plaintext passwords

A small but unspecified number of GitHub staff could have seen plaintext passwords.

By Zack Whittaker for Zero Day | May 1, 2018 -- 21:23 GMT (22:23 BST) | Topic: Security

fb_user_id	email	password
138263115	info@secappdev.org	CantHackThis
138263116	rmunroe@example.com	Correct horse battery staple
138263117	philippe@pragmaticwebsecurity.com	P@zzw0rd!

fb_user_id	email	password
138263115	info@secappdev.org	$2a$13$548oGCnkyiJ8RMJzozExpu1q2PJ3IH4qJqopdN068vb76q87IqjjS
138263116	rmunroe@example.com	$2a$13$yoQBhPFrCwBofYoewc7hhO73ZFv9VmD8ecek.9JNHKS9bfqbS8cPq
138263117	philippe@pragmaticwebsecurity.com	$2a$13$fBzHQZvCBG5nxPD.Kpzbluc9KEycyE1n7D9ARvJ1ZOi49t0KNuaES


GEFORCE GTX
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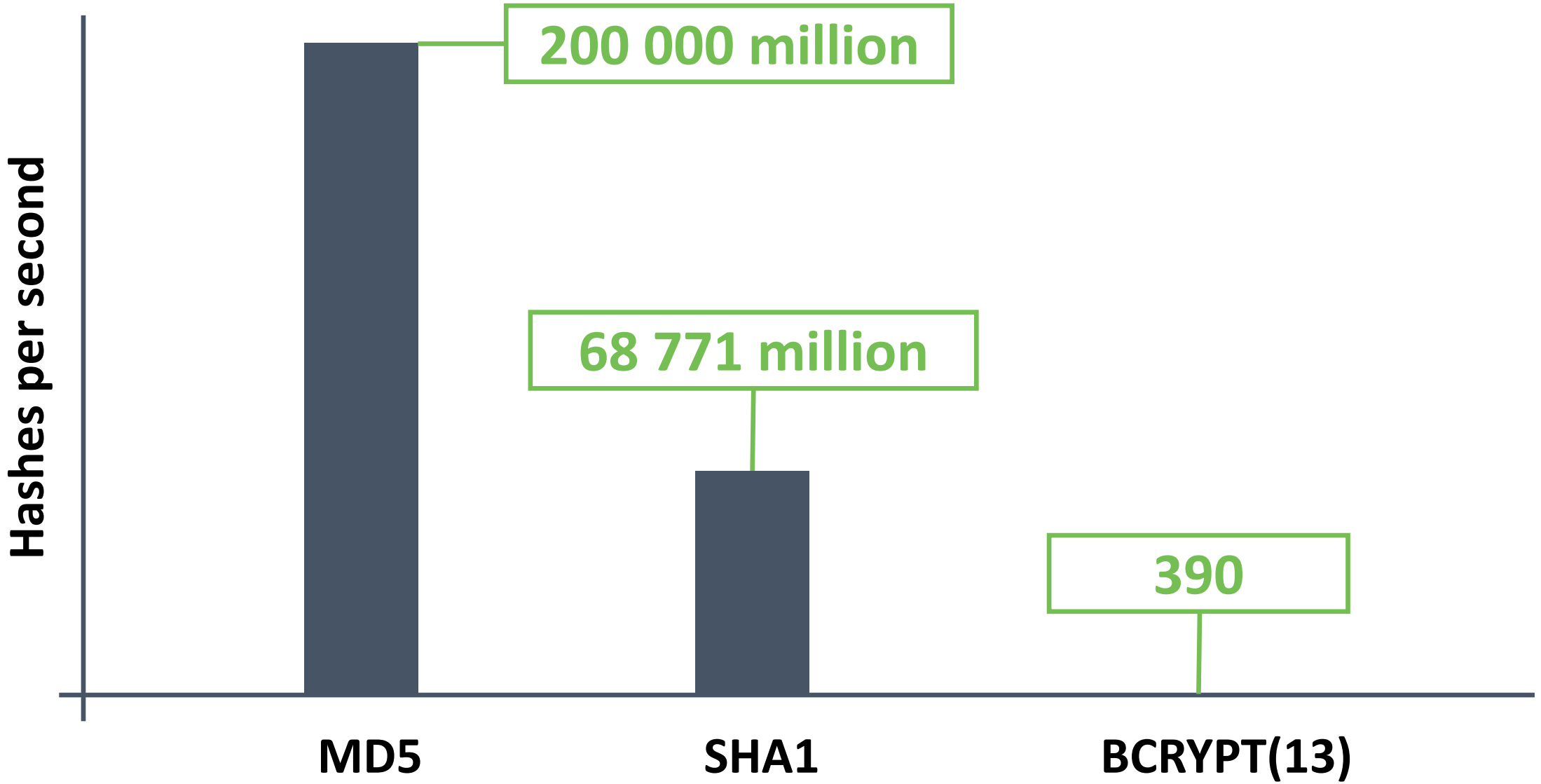
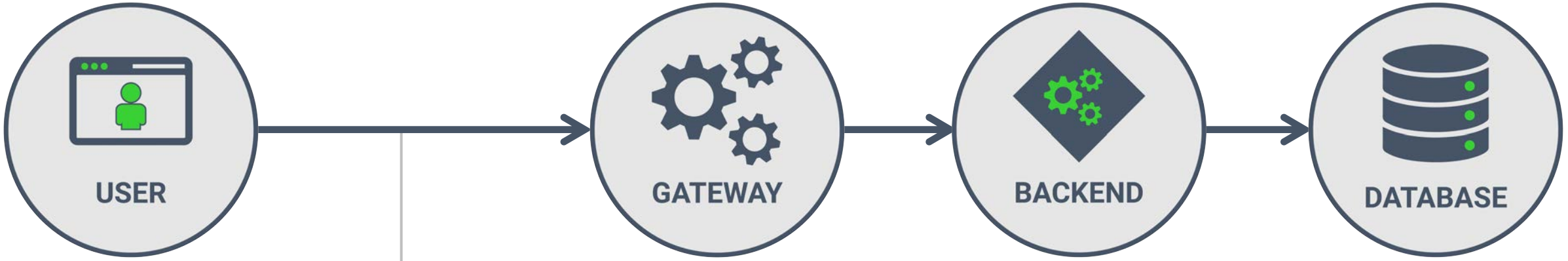
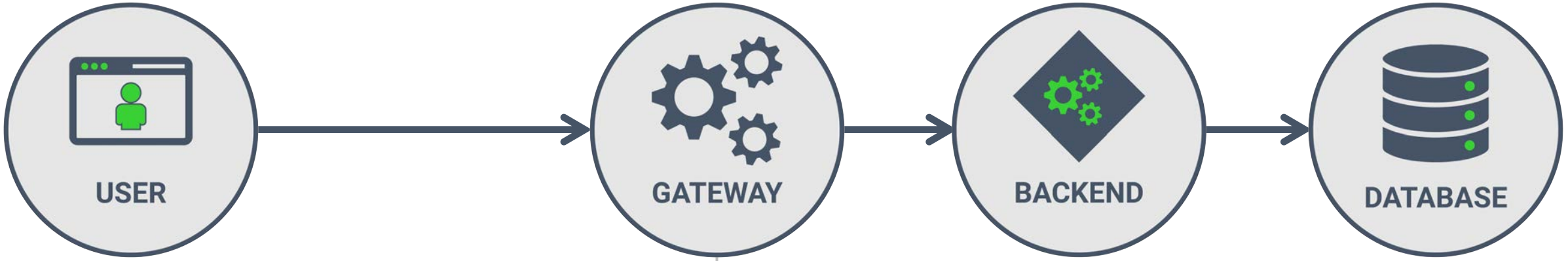
Is hash cracking really that fast?





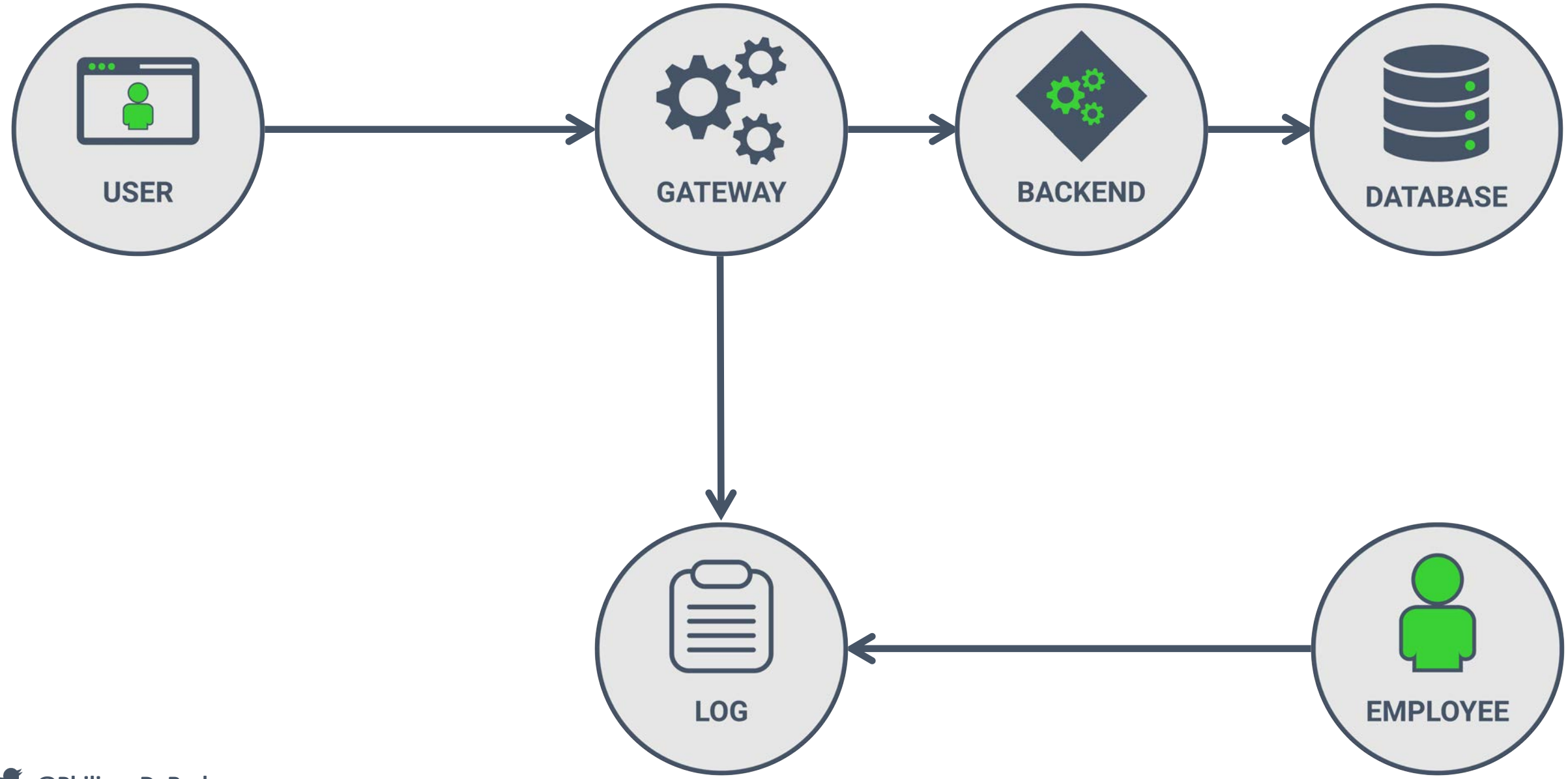
Submitting the login form

```
1  POST /login
2  Host: facebook.com
3  Content-Type: application/x-www-form-urlencoded
4
5   username=philippe@pragmaticwebsecurity.com
6  &password=P%40zzw0rd%21
```



Logging the POST request

```
{
  "url": "https://facebook.com/login",
  "method": "POST",
  "type": "application/x-www-form-urlencoded",
  "body": {
    "username": "philippe@pragmaticwebsecurity.com",
    "password": "P@zzw0rd!"
  }
}
```


USER
GATEWAY
BACKEND
DATABASE
LOG
EMPLOYEE


stackoverflow

19

The logback version 0.9.27 introduced replacement capability. Replacements support regular expressions. For example, if the logged message was "userid=alice, pswd='my secret'", and the output pattern was

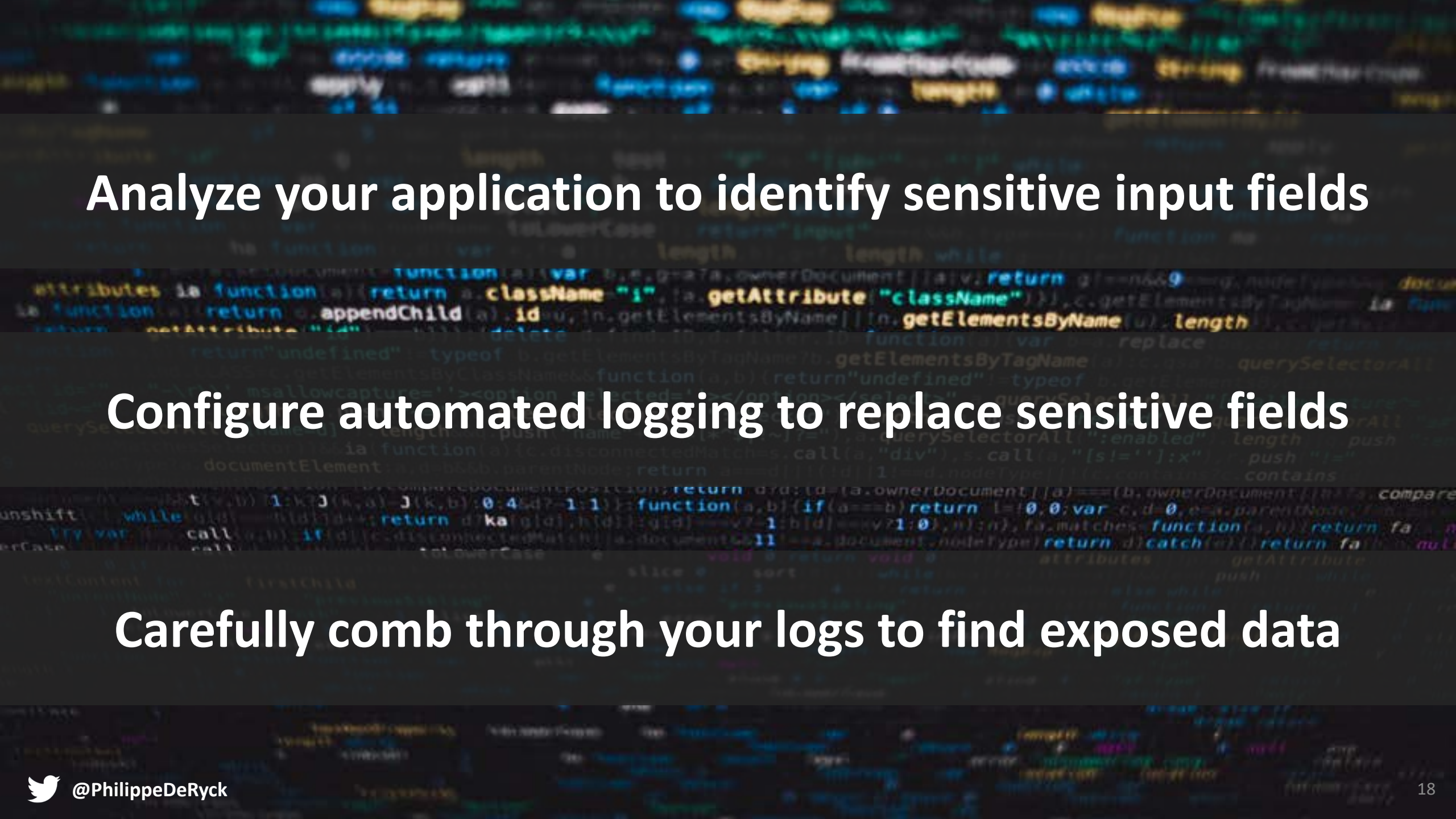
```
"%d [%t] $logger - %msg%n",
```

you just modify the pattern to

```
"%d [%t] $logger - %replace(%msg){"pswd='.*'", "pswd='xxx'"}%n"
```

Note that the above makes use of option quoting.

The previous log message would be output as "userid=alice, pswd='xxx'"



Analyze your application to identify sensitive input fields

Configure automated logging to replace sensitive fields

Carefully comb through your logs to find exposed data


EQUIFAX

Equifax uses *Apache Struts 2* to build applications

a patched version of *Struts2* fixes a remote code execution vulnerability

March 7th, 2017

Equifax discovers the breach of their systems

July 29th, 2017

Equifax announces the breach of 147 million people

September 7th, 2017

May 2017

attackers escalate the attack to full-scale data exfiltration

March 10th, 2017

attackers start probing *Equifax* systems using the *Struts* vulnerability


Ask Equifax
@AskEquifax
Follow
Happy Friday! You've got Stevie ready and willing to help with your customer service needs today!
5:00 AM - 8 Sep 2017
11 Retweets 9 Likes
66
11
9

Former Equifax CEO blames breach on one IT employee

Someone didn't install a patch when they should've. That's it. That caused the 145-million person data leak.

David Lumb, @OutOnALumb
10.03.17

75
Comments

3762
Shares

- An audit in 2015 already revealed a grossly inadequate patching process
- The interview with Equifax executives revealed that they had to guess who the owner for a particular application was
- Following the initial alert to patch, the matter was mentioned on a Powerpoint slide once

Equifax's CEO did not prioritize cybersecurity.

[The CIO] testified [the CEO] held quarterly senior leadership team meetings where IT security was just one of the many topics discussed.

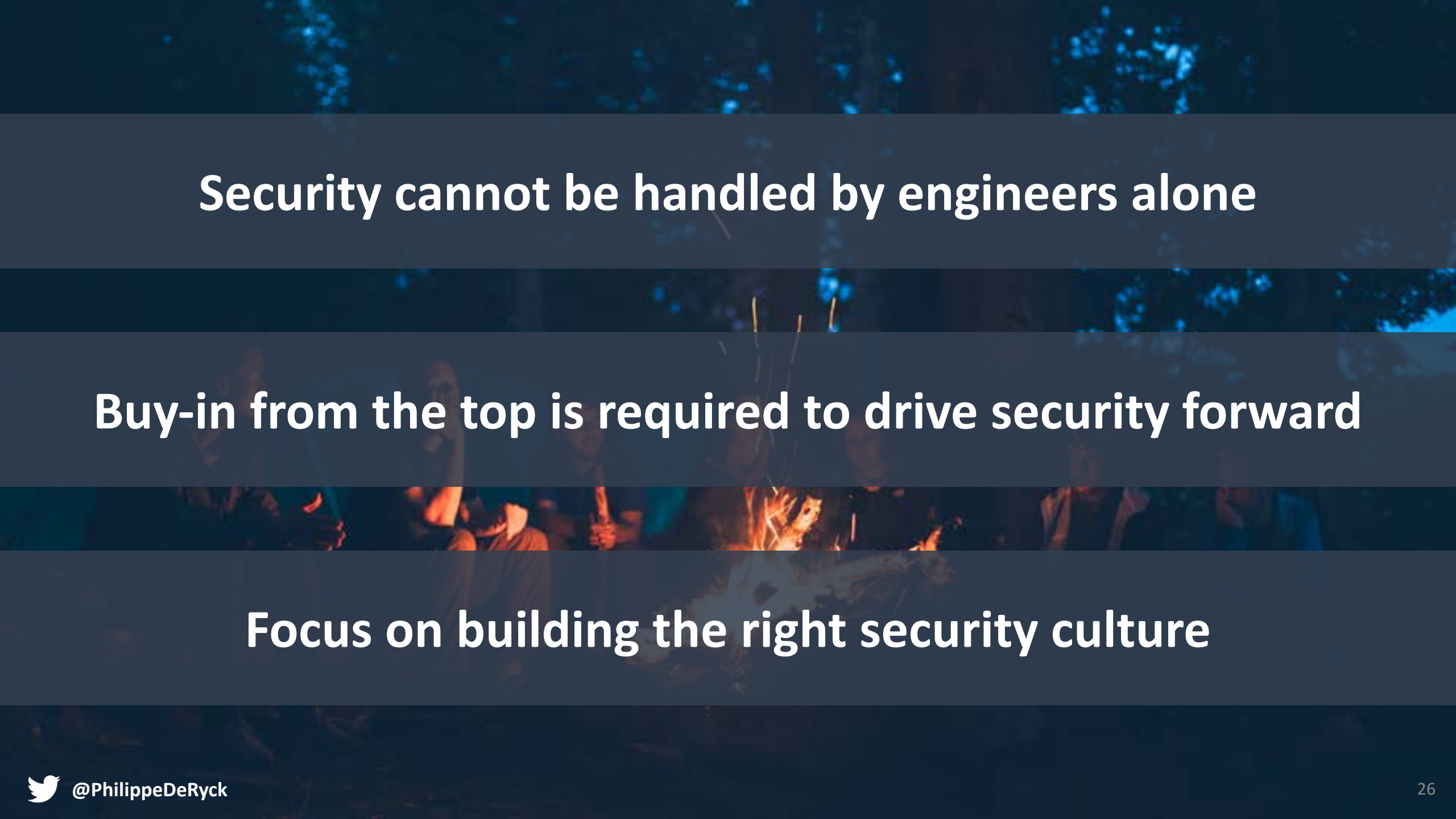
The information [the CEO] did receive was presented by the head of the legal department, who did not have any background in IT or security – rather than [the CSO], the company's IT security expert.

Equifax had a network monitoring device installed

Which failed to detect the ongoing attack

Because it's TLS certificate expired

19 months before the attack



Security cannot be handled by engineers alone

Buy-in from the top is required to drive security forward

Focus on building the right security culture

> 97%

of code in a modern web app are dependencies

```
$ ng new clean-app

? Would you like to add Angular routing? Yes
? Which stylesheet format would you like to use? Sass


added 1169 packages from 1030 contributors and audited
42445 packages in 28.75s
```

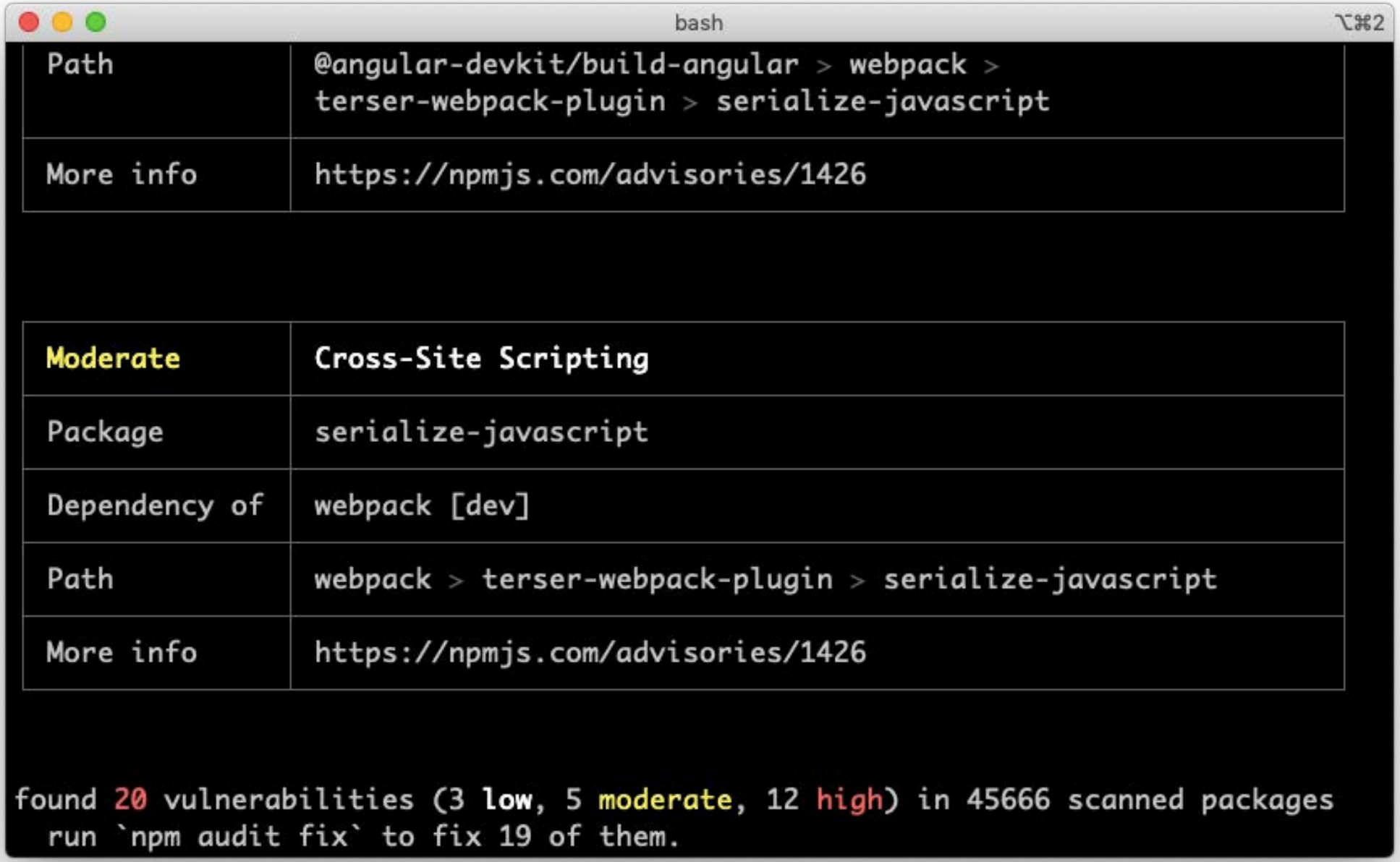
$ cloc node_modules/

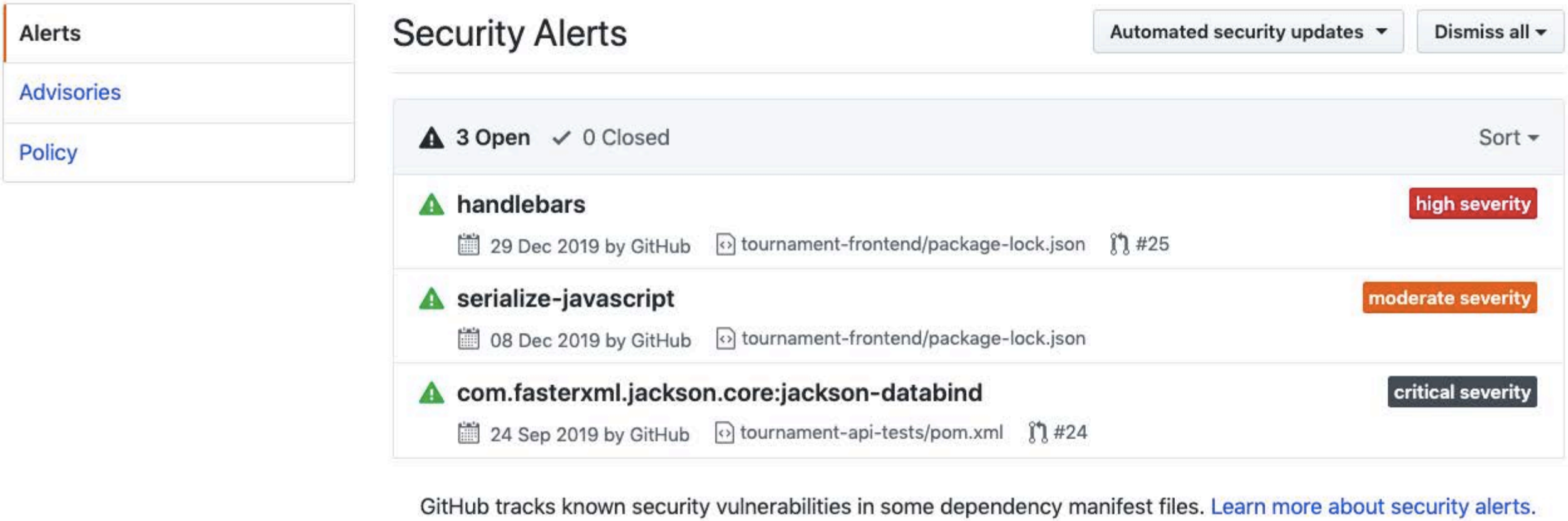
Language	files	blank	comment	code
JavaScript	12683	145344	525680	1773037
JSON	1555	104	0	161571
Markdown	1385	65564	4	157446
TypeScript	2892	9625	90588	104376
HTML	274	1656	218	33724
CSS	148	299	2301	22382
C++	75	3784	3501	22332
Python	51	4205	7606	18695
C/C++ Header	101	2758	1858	15114
LESS	482	1611	410	11321
XML	20	3237	1300	7617
YAML	163	140	112	2416
Bourne Shell	18	292	333	1500
SVG	8	2	2	776
make	30	236	39	715
Windows Module Definition	7	115	0	641
DTD	1	179	177	514
...				
SUM:	19983	239598	634354	2336228

```
$ ng new clean-app

? Would you like to add Angular routing? Yes
? Which stylesheet format would you like to use? Sass


added 1169 packages from 1030 contributors and audited
42445 packages in 28.75s
```

78%

of vulnerabilities occur in indirect dependencies

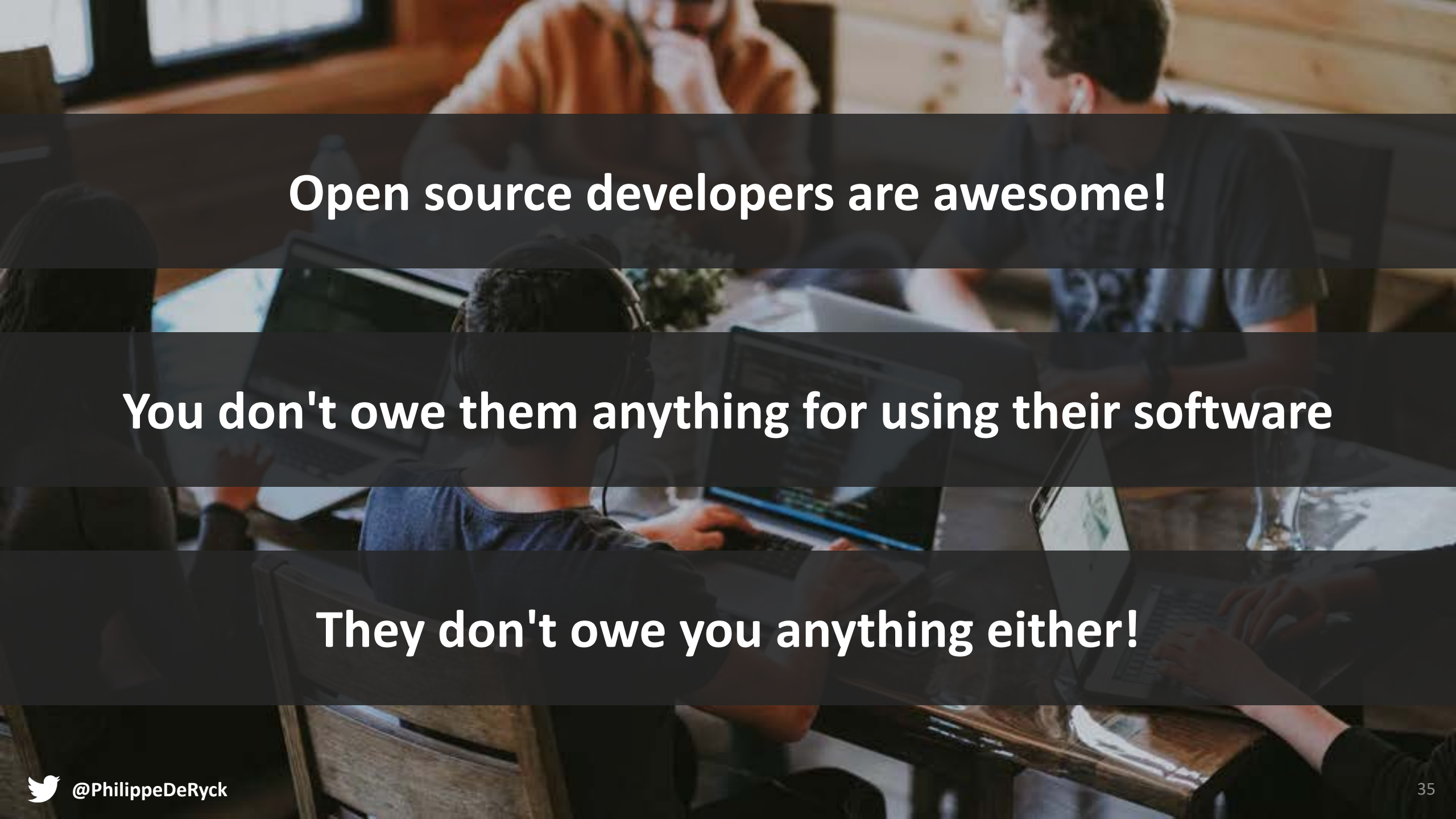

bash
⌥⌘2
Path
@angular-devkit/build-angular > webpack > terser-webpack-plugin > serialize-javascript
More info
https://npmjs.com/advisories/1426
Moderate
Cross-Site Scripting
Package
serialize-javascript
Dependency of
webpack [dev]
Path
webpack > terser-webpack-plugin > serialize-javascript
More info
https://npmjs.com/advisories/1426
found 20 vulnerabilities (3 low, 5 moderate, 12 high) in 45666 scanned packages
run `npm audit fix` to fix 19 of them.


Alerts
Advisories
Policy
Security Alerts
Automated security updates
Dismiss all
3 Open
0 Closed
Sort
handlebars
high severity
29 Dec 2019 by GitHub
tournament-frontend/package-lock.json
#25
serialize-javascript
moderate severity
08 Dec 2019 by GitHub
tournament-frontend/package-lock.json
com.fasterxml.jackson.core:jackson-databind
critical severity
24 Sep 2019 by GitHub
tournament-api-tests/pom.xml
#24
GitHub tracks known security vulnerabilities in some dependency manifest files. Learn more about security alerts.

Keep applications up to date,
so you can apply security patches quickly

Have a fast security release process,
next to a slower feature release process

Test your process with
a non-critical vulnerability to make sure it works



Open source developers are awesome!

You don't owe them anything for using their software

They don't owe you anything either!

Get off your ass.

dougwilson commented on 5 May 2019 Member

I don't think you understand that when this happens, I literally get hate emails to my email address. I removed my email address from GitHub, but they still get it. Here is a literal quoted email:

> Fucking release an express that does not have a security vulnerability out of the box. I can no longer check in code to my company CI because audit blocks it. Get off your ass.

dougwilson commented on 5 May 2019 Member

I should just disappear from GitHub / Node.js at this point... I can't catch a break and even enjoy this weekend :(

finalhandler sets a default CSP policy on its error pages (`default-src 'self'`)

A researcher opens an issue to recommend a stricter policy (`default-src 'none'`)

February 20th, 2019

Dependency audits start failing on the NPM advisory

May 3rd, 2019

Package owner suffers outrageous abuse from other developers

May 5th, 2019

May 5th, 2019

SourceClear picks up the report as well, restarting the cycle

May 3rd, 2019

A user warns that this problem is now an NPM security advisory

May 2019

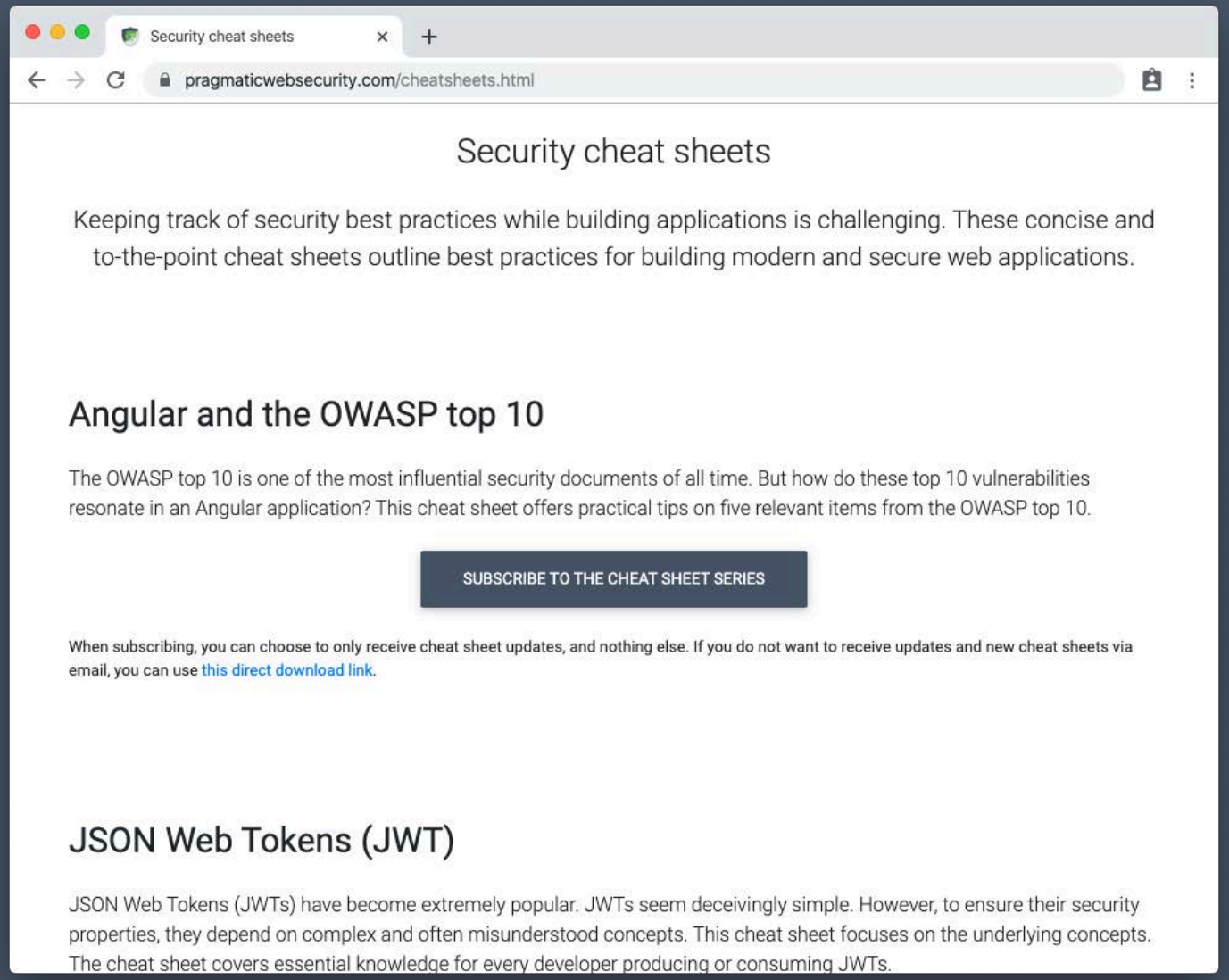
The issue is also reported on HackerOne, with severity "none"

March 4th, 2019

The package owner and researcher exchange a couple of messages


Let us develop respect for all living
things. Let us try to replace violence
and intolerance with understanding
and compassion. And love.
Jane Goodall
quotefancy

FREE SECURITY CHEAT SHEETS FOR MODERN APPLICATIONS



@PhilippeDeRyck

https://cheatsheets.pragmaticwebsecurity.com/

SecAppDev

March 9th – 13th, 2020
Leuven, Belgium

A week-long course on Secure Application Development

Taught by experts from around the world

38 in-depth lectures and 3 one-day workshops

https://secappdev.org

A yearly initiative from the SecAppDev.org non-profit, since 2005

THANK YOU!

Follow me on Twitter to stay up to date on web security best practices

@PhilippeDeRyck