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The Legacy of Log4shell™

(And the Future of DevSecOps)

Texas Linux Fest
2024-04-13

Paul Novarese, Solutions Engineer, Anchore

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Fediverse: @pvn@mas.to

Paul Novarese, Solutions Engineer, Anchore

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This is not a utopian talk with magic solutions

Agenda

01 Log4Shell Today

02 A Fundamental Shift

03 Software “Supply” Chains

04 Three Big Things

Learn From Log4Shell

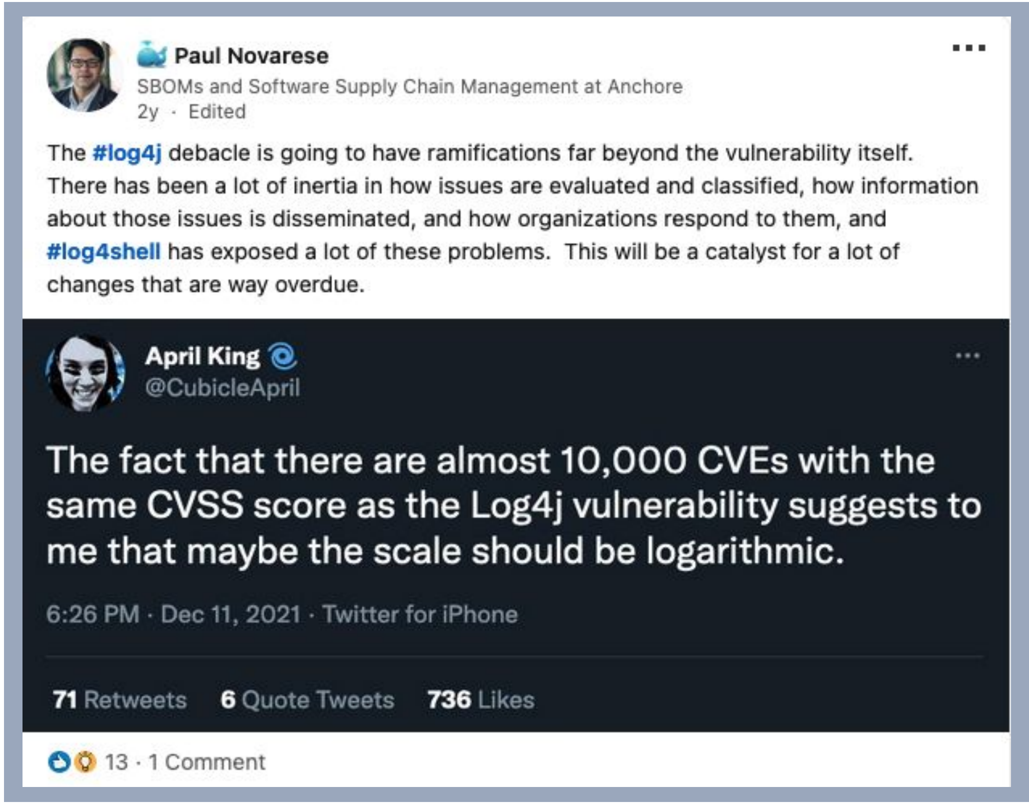
Log4Shell Rewind

I posted this in December 2021 right after log4shell dropped

Almost a year later, October 2022 I presented "learn from log4shell" at devopsdays houston, I had basically given up and said this was completely wrong

Now it may end up being correct, but not in the way I thought

https://twitter.com/CubicleApril/status/1469825942684160004
https://www.linkedin.com/posts/novarese_log4j-log4shell-activity-6876206319238463488-8bEA



Paul Novarese
SBOMs and Software Supply Chain Management at Anchore
2y · Edited

The #log4j debacle is going to have ramifications far beyond the vulnerability itself. There has been a lot of inertia in how issues are evaluated and classified, how information about those issues is disseminated, and how organizations respond to them, and #log4shell has exposed a lot of these problems. This will be a catalyst for a lot of changes that are way overdue.

April King
@CubicleApril

The fact that there are almost 10,000 CVEs with the same CVSS score as the Log4j vulnerability suggests to me that maybe the scale should be logarithmic.

6:26 PM · Dec 11, 2021 · Twitter for iPhone

71 Retweets 6 Quote Tweets 736 Likes

13 · 1 Comment

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The State of Log4Shell Today

Log4Shell Today

It's been over two years and log4shell is still the single most exploited CVE

Data from CISA - cybersecurity and infrastructure security agency
https://www.cisa.gov/news-events/cybersecurity-advisories/aa22-279a

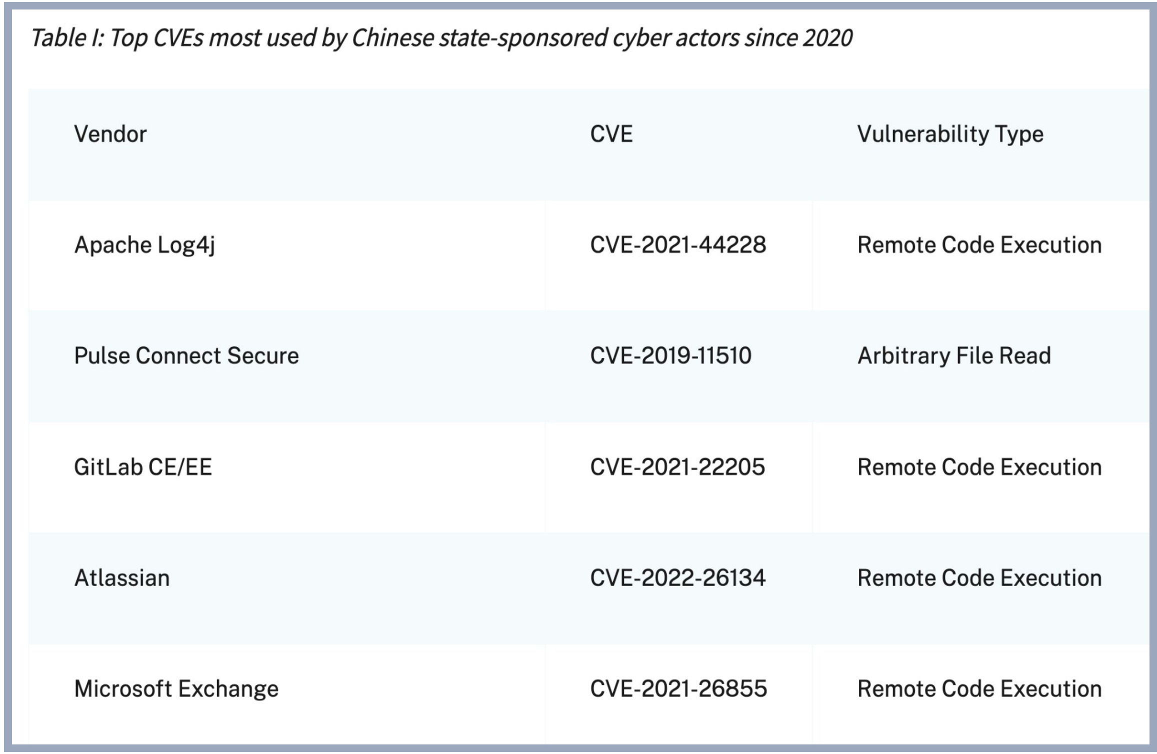
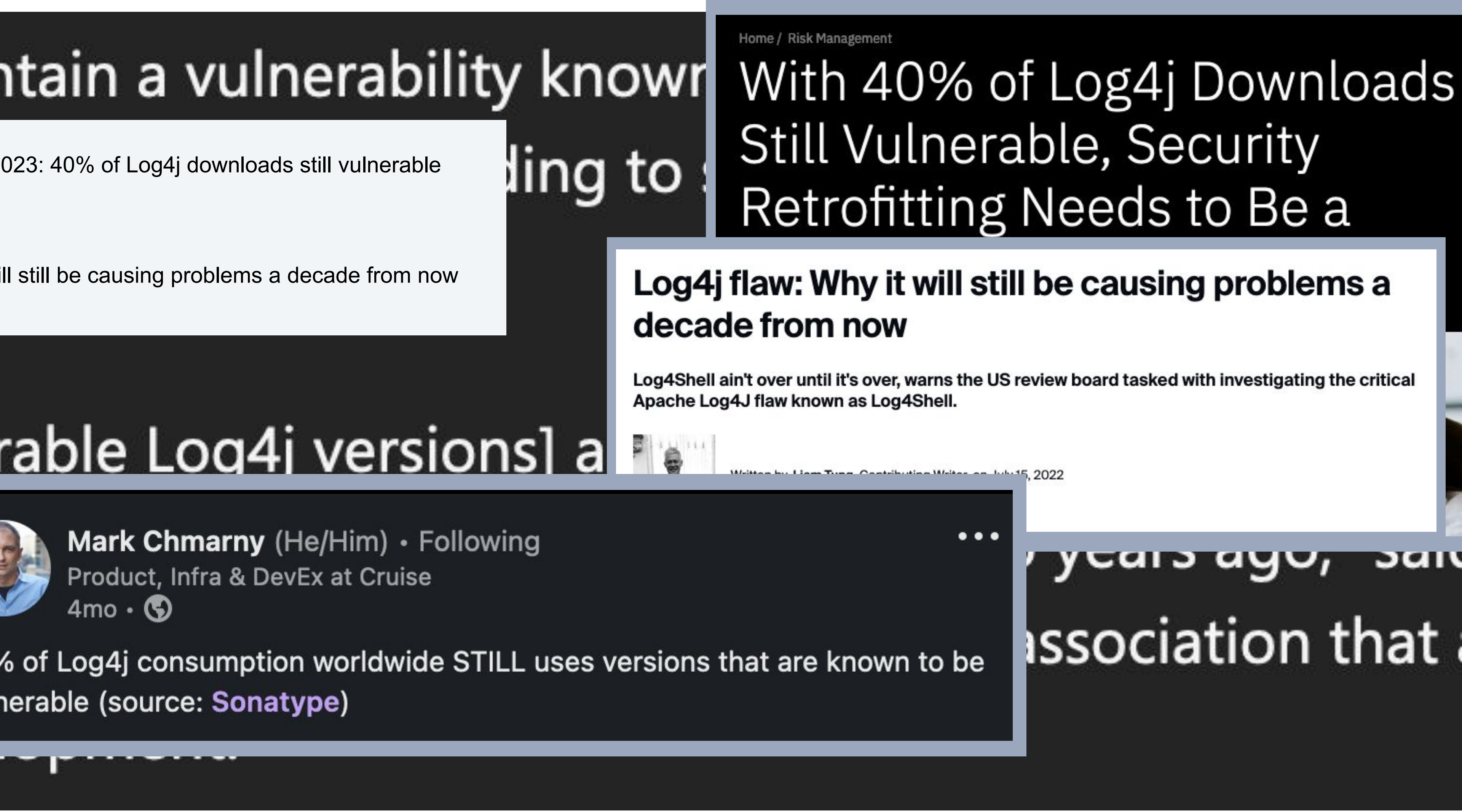


Table I: Top CVEs most used by Chinese state-sponsored cyber actors since 2020

Vendor	CVE	Vulnerability Type
Apache Log4j	CVE-2021-44228	Remote Code Execution
Pulse Connect Secure	CVE-2019-11510	Arbitrary File Read
GitLab CE/EE	CVE-2021-22205	Remote Code Execution
Atlassian	CVE-2022-26134	Remote Code Execution
Microsoft Exchange	CVE-2021-26855	Remote Code Execution

Fukishima Daiichi
Incident: 2011
Cleanup: at LEAST thirty years

Chernobyl
Incident: 1986
Cleanup: at LEAST until 2065



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years ago," sai

association that a

opment.

023: 40% of Log4j downloads still vulnerable

ill still be causing problems a decade from now

Home / Risk Management

With 40% of Log4j Downloads Still Vulnerable, Security Retrofitting Needs to Be a

Log4j flaw: Why it will still be causing problems a decade from now

Log4Shell ain't over until it's over, warns the US review board tasked with investigating the critical Apache Log4J flaw known as Log4Shell.

Written by Liam Tung, Contributing Writer on July 15, 2022

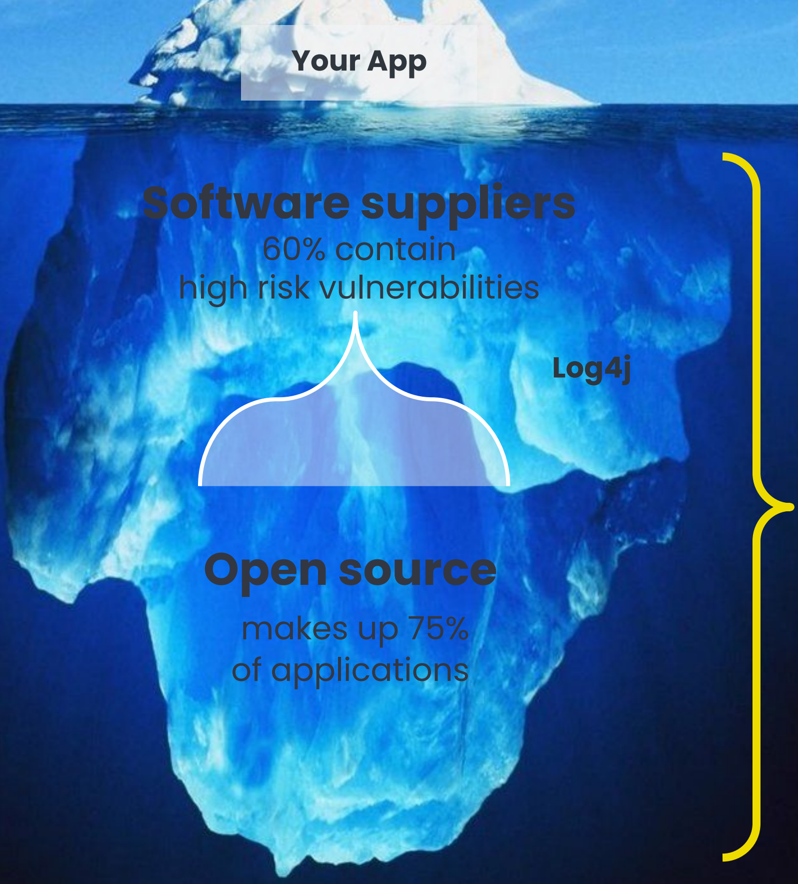
Mark Chmarny (He/Him) • Following
Product, Infra & DevEx at Cruise
4mo •

% of Log4j consumption worldwide STILL uses versions that are known to be nerable (source: Sonatype)

Log4Shell Highlighted a Fundamental Shift

Hidden Risk in the Software Supply Chain

Risk in the Software Supply Chain



Your App

Software suppliers

60% contain
high risk vulnerabilities

Log4j

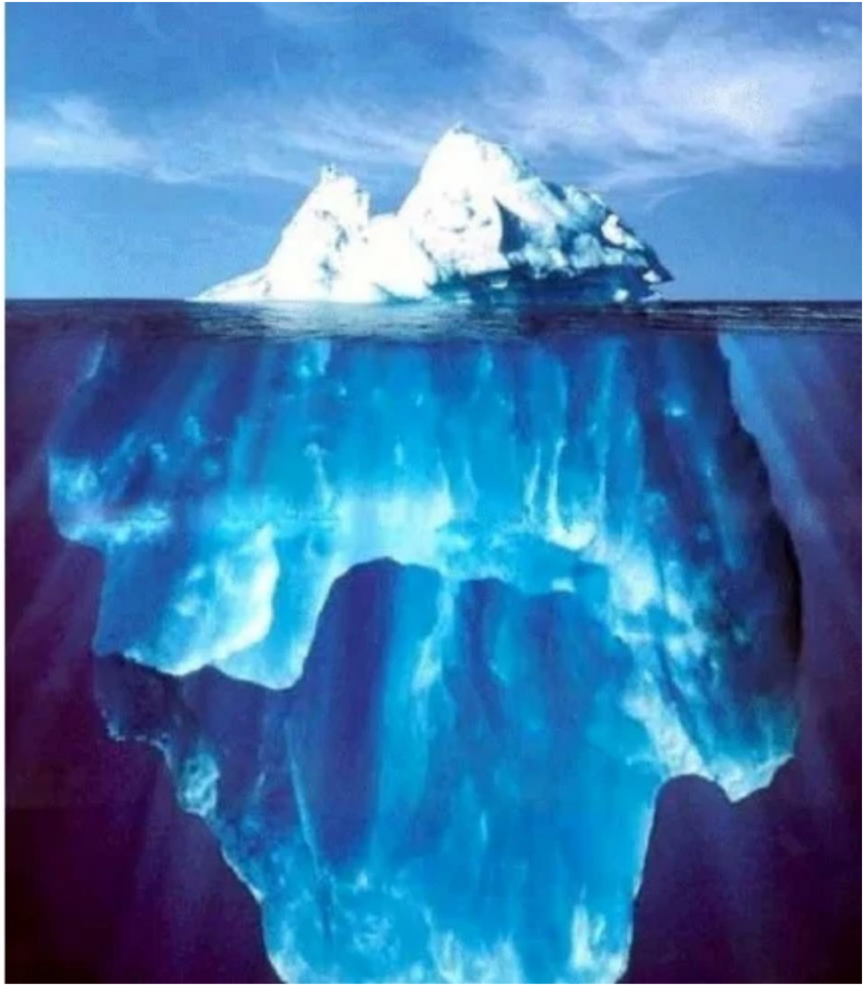
Open source

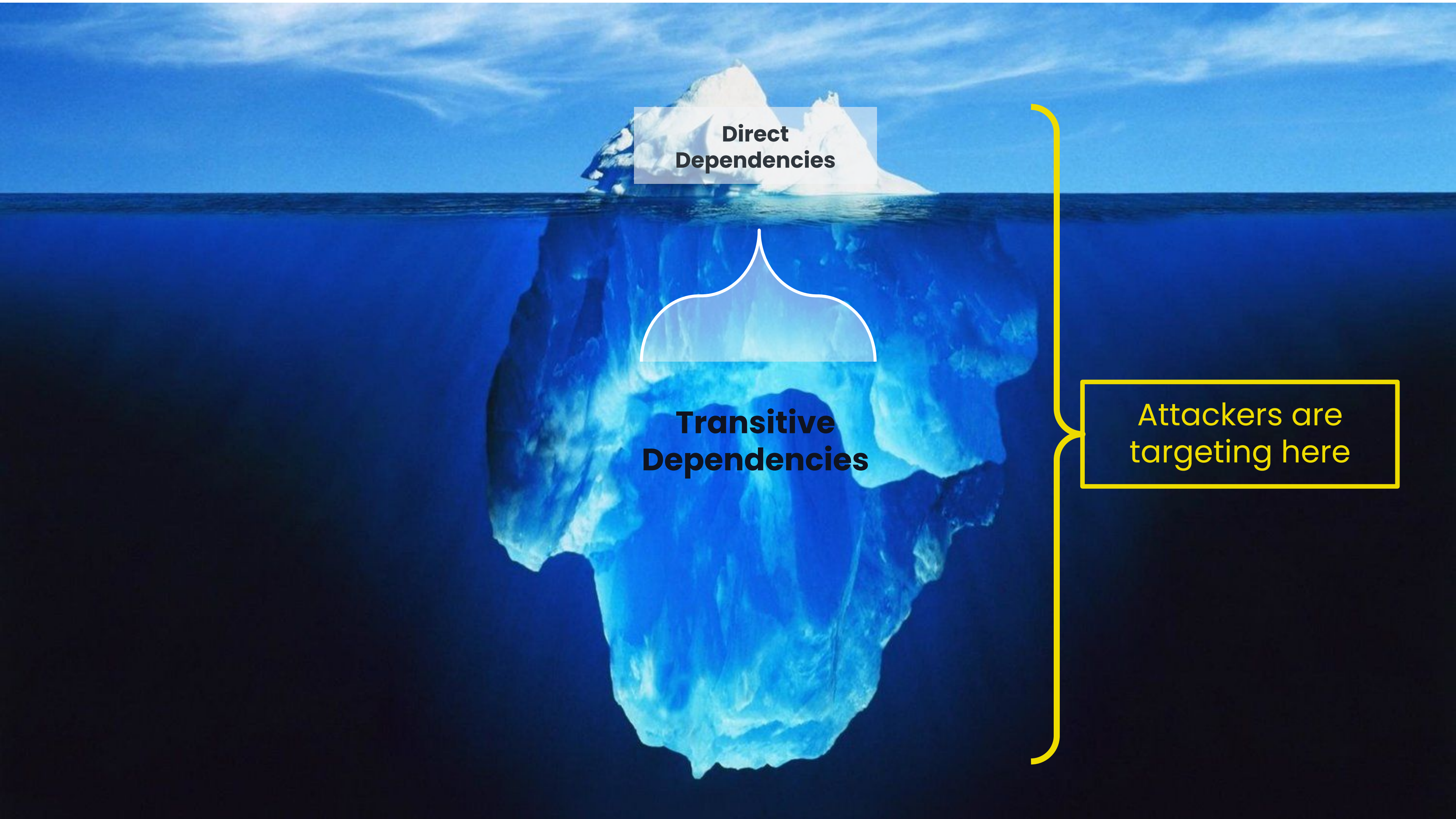
makes up 75%
of applications

Attackers are
targeting here

Free is Just the Tip of the Iceberg: Open Source Library System Software

Lori Bowen Ayre
lori.ayre@galecia.com
METRO Webinar
October 6, 2009





Direct Dependencies

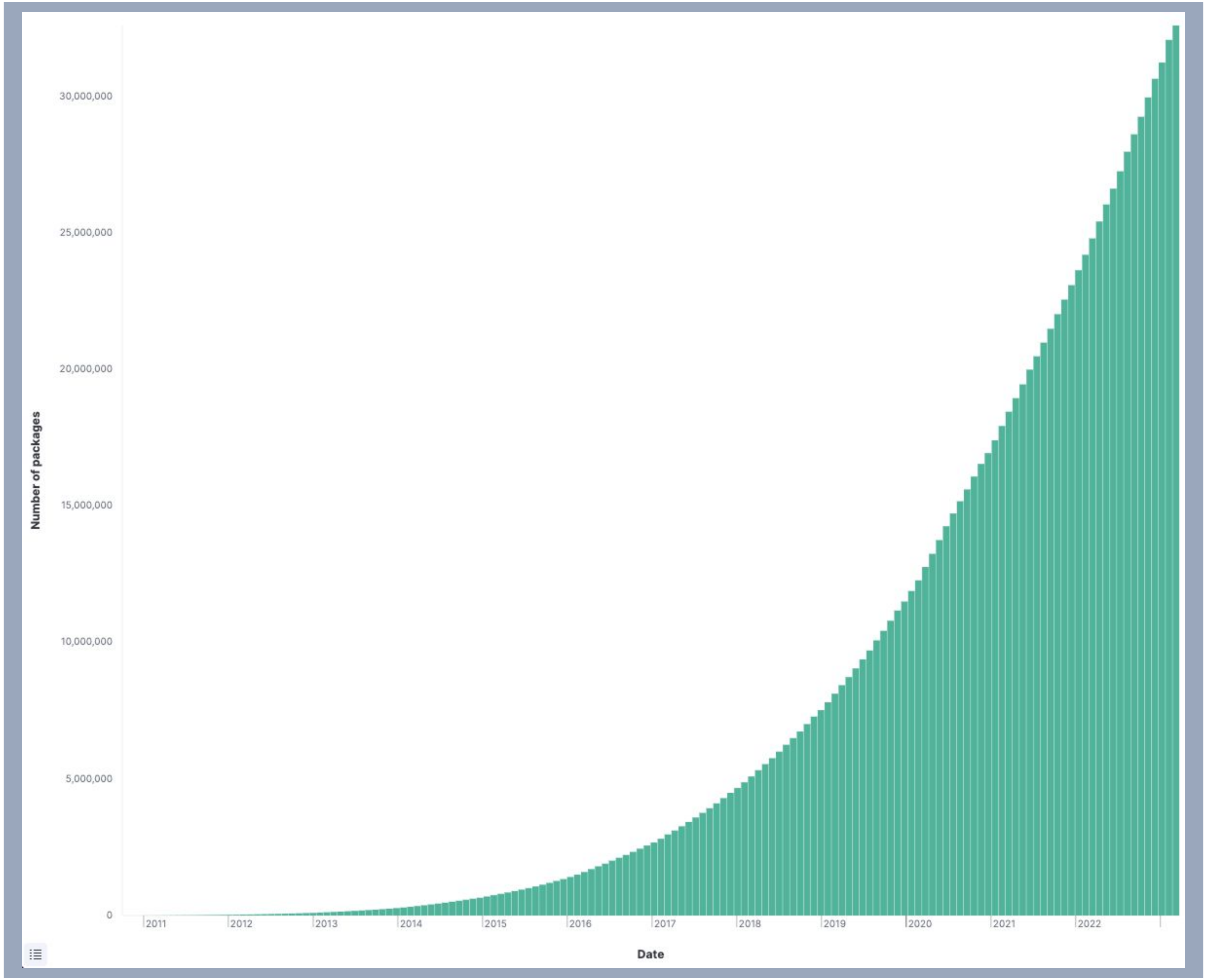
Transitive Dependencies

Attackers are targeting here

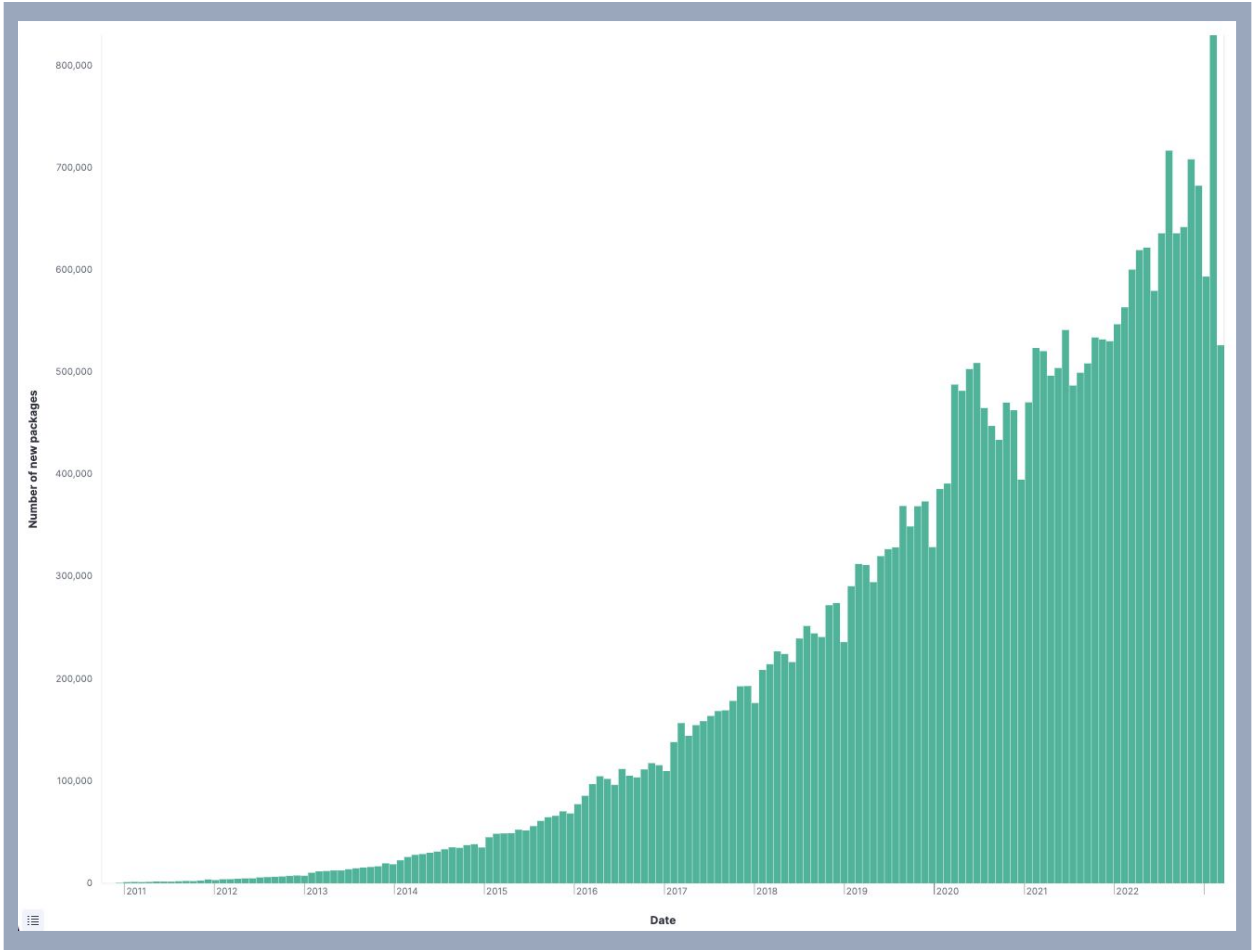
This metaphor…

- You’ve seen this iceberg metaphor. I’ve used this metaphor 100 times, I’ve criticized this metaphor.
- This is an OLD metaphor
- Things have changed a lot but we’re still thinking about old systems
- https://www.slideshare.net/loriayre/open-source-library-system-software-free-is-just-the-tip-of-the-iceberg
- They’re attacking the bottom now - that’s a supply chain attack
- But really, the top isn’t “your code” - the top is your direct dependencies, bottom is transitive
- You can only directly control what’s at the top
- They’re attacking the whole iceberg, but you probably only know about the stuff at the top
- The change is largely due to the massive rise in software package managers
- The CVE system predates this change and hasn’t really evolved

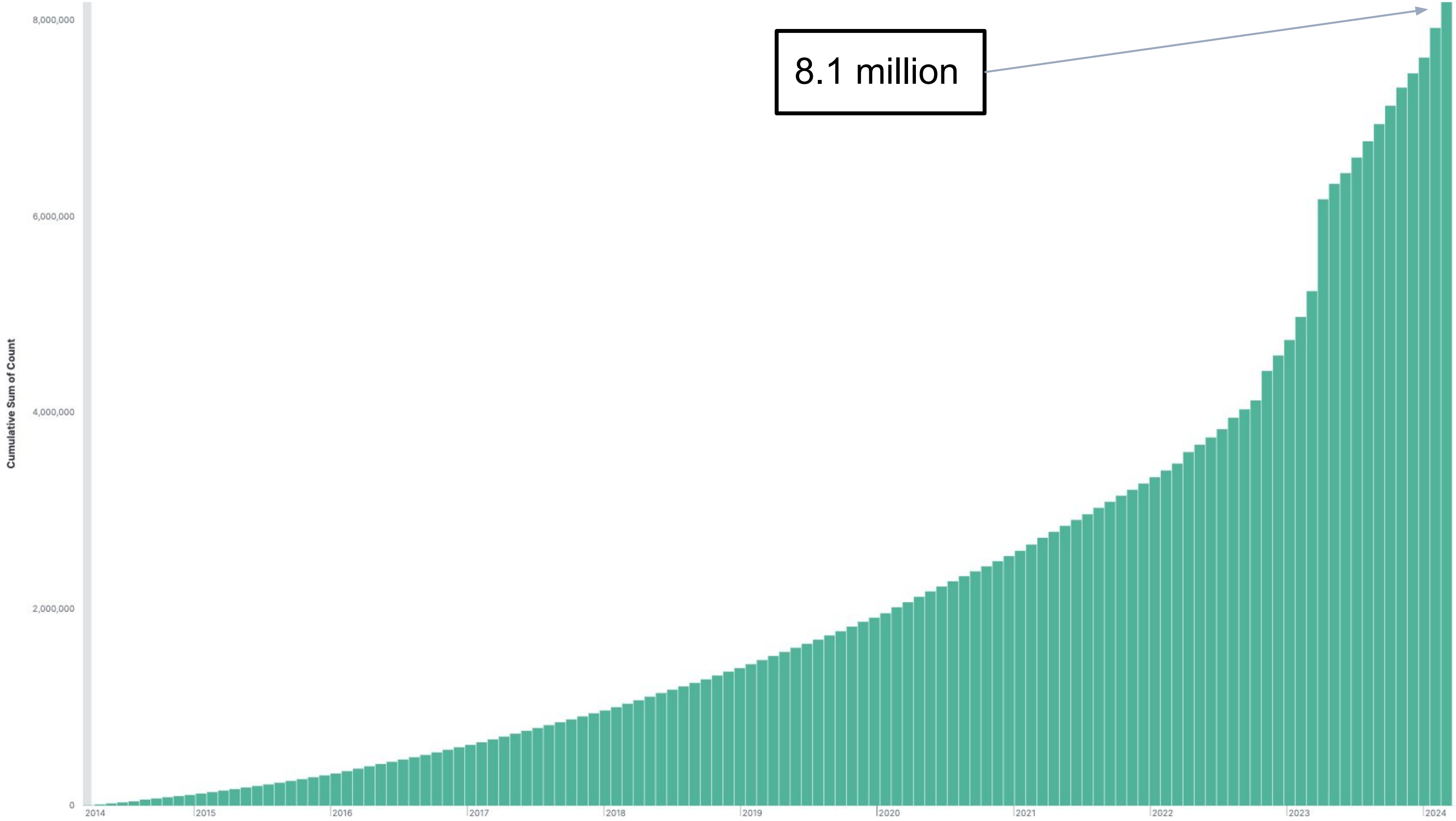
Number of NPM packages



Number of NEW packages



How big is big? (all packages over time)



8.1 million

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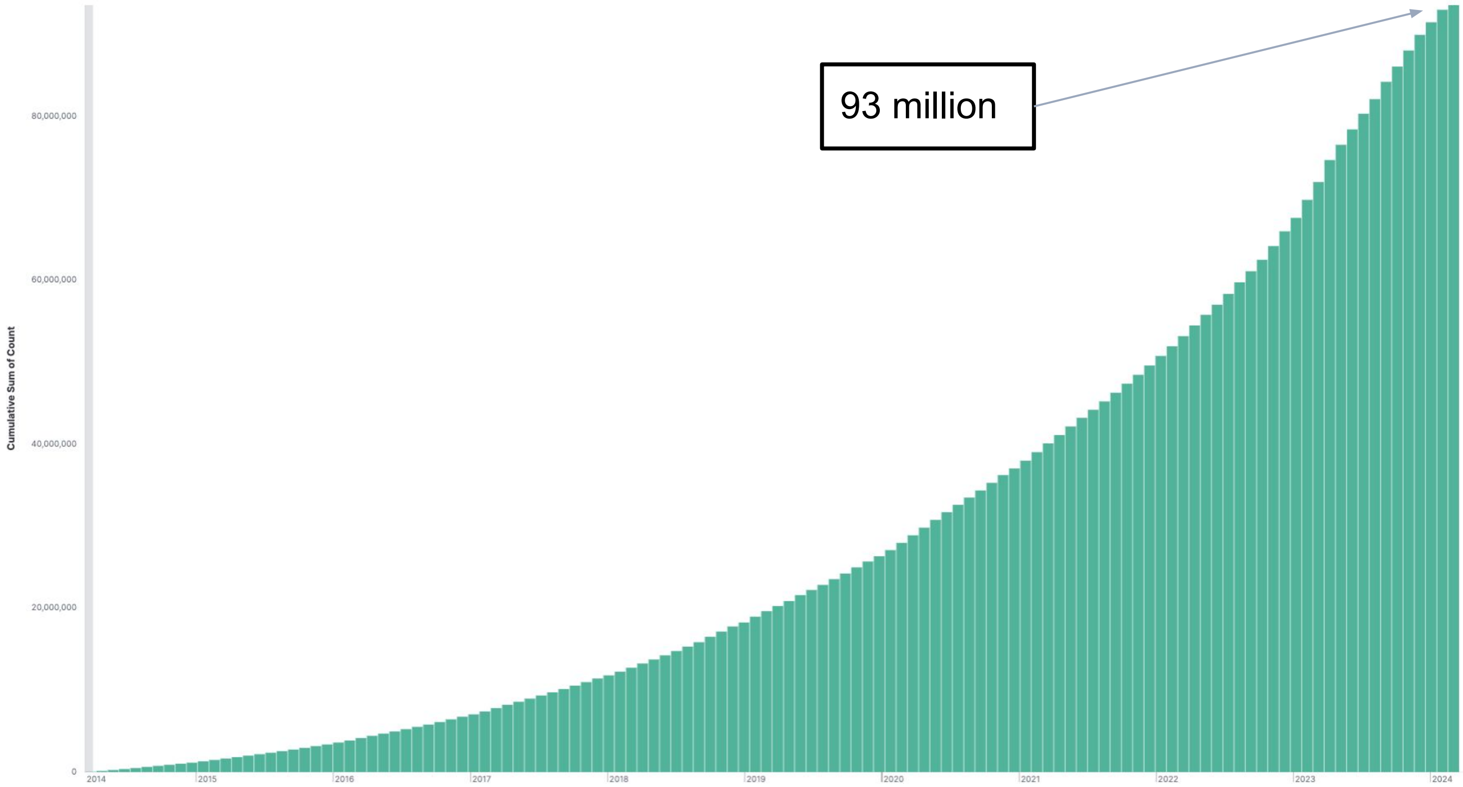
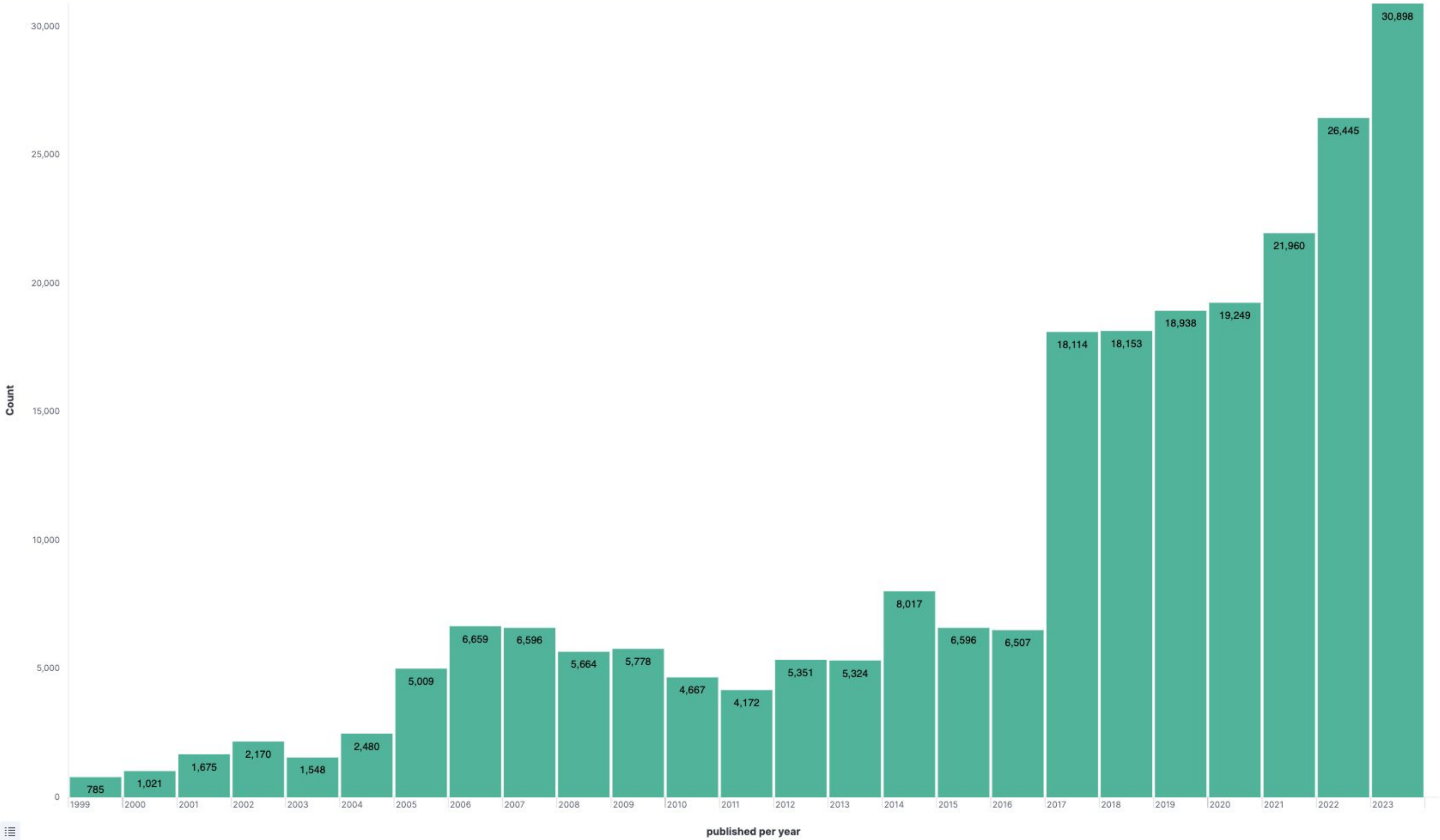
How big is big? (all versions of all packages)



93 million

Also CVE growth



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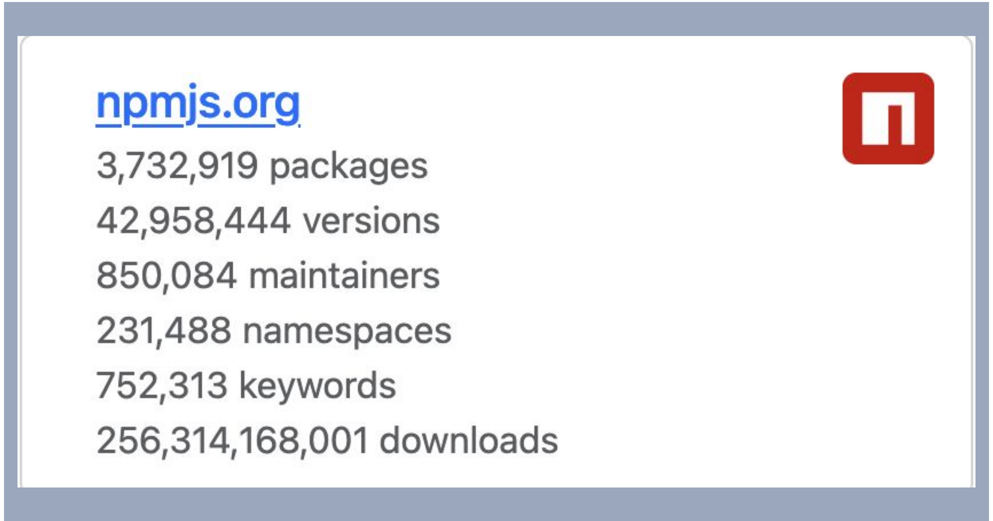
Open source is huge

- NPM introduced 2010
- 43 million packages (as of April)
- Approx 1,000,000 new packages **per month**
- That’s just NPM!



npmjs.org

3,732,919 packages

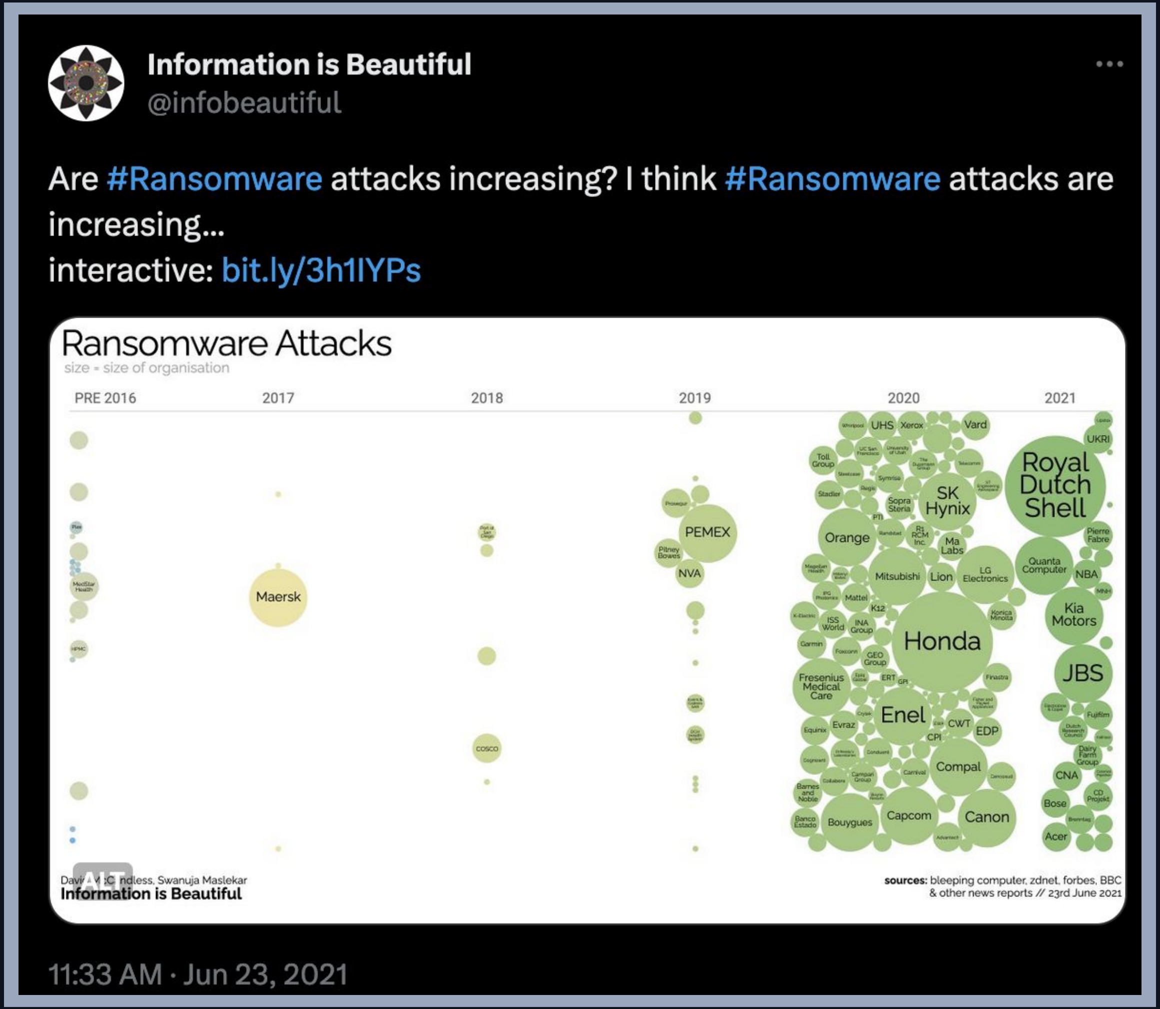
42,958,444 versions

850,084 maintainers

231,488 namespaces

752,313 keywords

256,314,168,001 downloads



Information is Beautiful
@infobeautiful

Are #Ransomware attacks increasing? I think #Ransomware attacks are increasing...
interactive: bit.ly/3h1lYPs

Ransomware Attacks
size = size of organisation

David McCandless, Swanuja Maslekar
Information is Beautiful

sources: bleeping computer, zdnet, forbes, BBC
& other news reports // 23rd June 2021

11:33 AM · Jun 23, 2021

The predictable consequence

- Ransomware has exploded along with transitive dependencies and open source in general
- I don’t believe in coincidences

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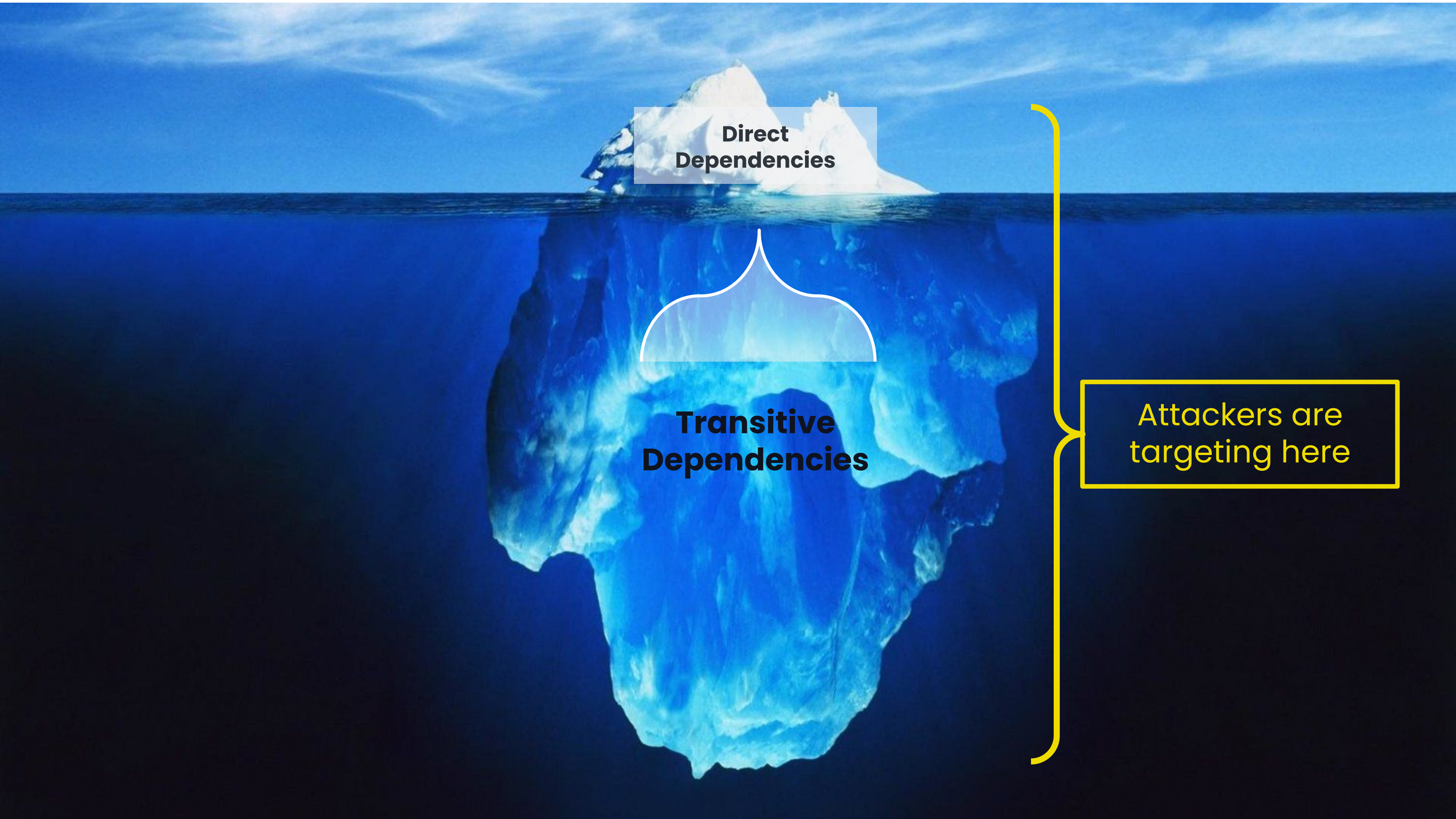


Direct Dependencies

Transitive Dependencies

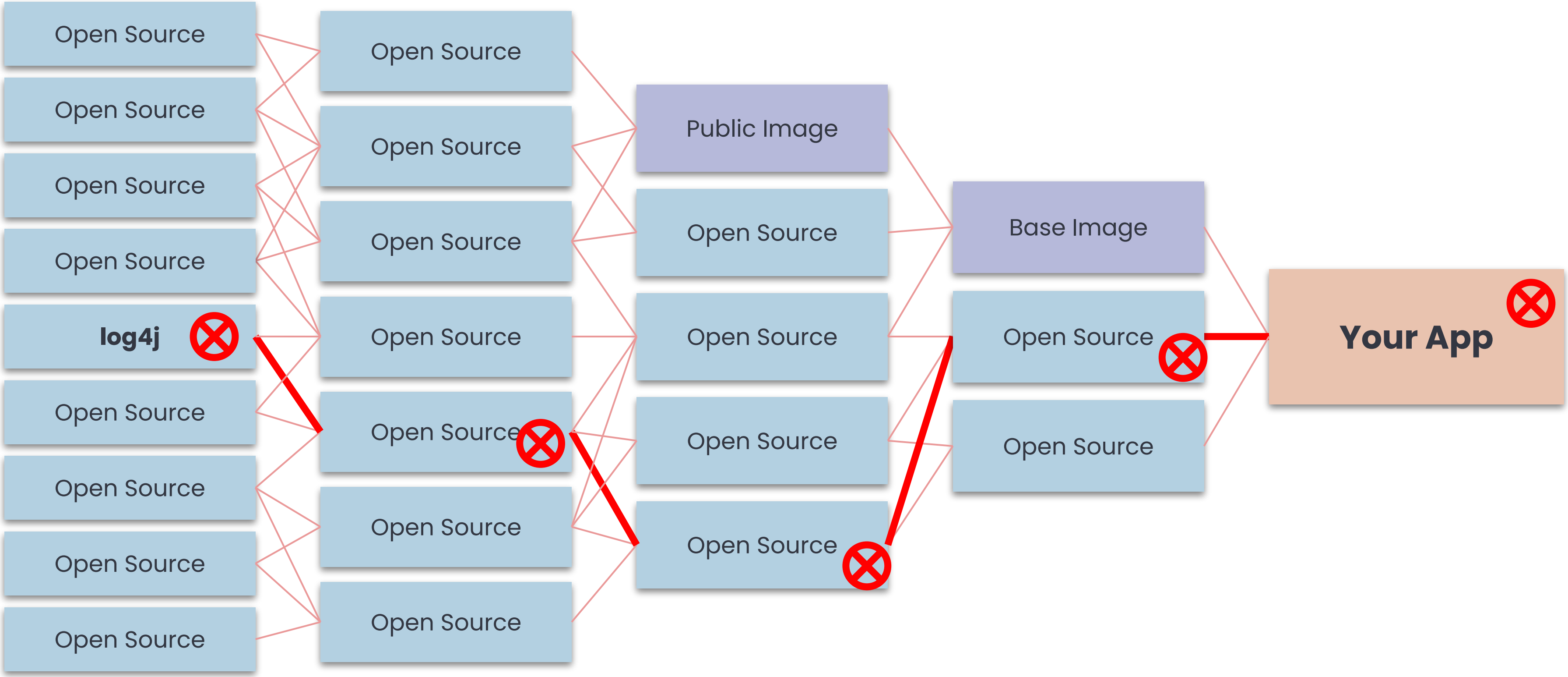
Attackers are targeting here

If We Knew What We are Consuming

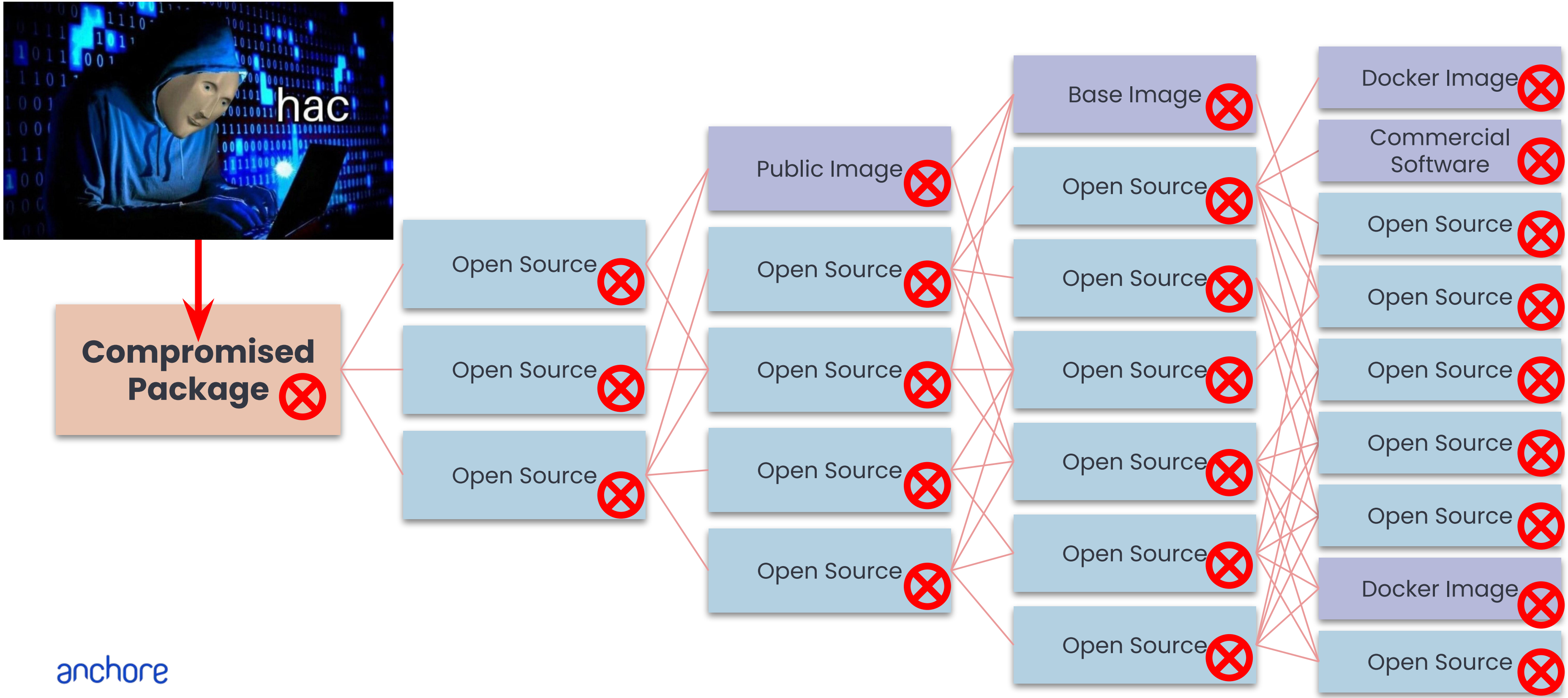
- People spent insane amounts of time just finding log4j, because nobody knew where (or even if) it was hiding
- Knowing = Faster Remediation
- SBOMs help, a LOT, but… "a phone book is not illuminating"
  - They aren't a silver bullet
  - Scanners aren't perfect (e.g. can't penetrate binary blobs, cf. OpenSSL3.)
  - Not all SBOMs are equal
  - SBOMs aren't ubiquitous (yet) (producers aren't reliably supplying them)
  - SBOMs are more accurate and useful when producers/maintainers generate them BUT something is better than nothing
  - SBOM management is hard
  - Any SBOM generated before an actual build is suspect (transitive deps)
  - SBOM Everywhere: https://github.com/ossf/sbom-everywhere
  - I don't know what the end game is but generating them is better than nothing, figure out the details later

Software “Supply” Chains

Software “Supply” Chain: The ~~Iceberg~~ Funnel



The Reverse Funnel



Compromised Package

Open Source

Open Source

Open Source

Public Image

Open Source

Open Source

Open Source

Open Source

Base Image

Open Source

Open Source

Open Source

Open Source

Open Source

Open Source

Docker Image

Commercial Software

Open Source

Open Source

Open Source

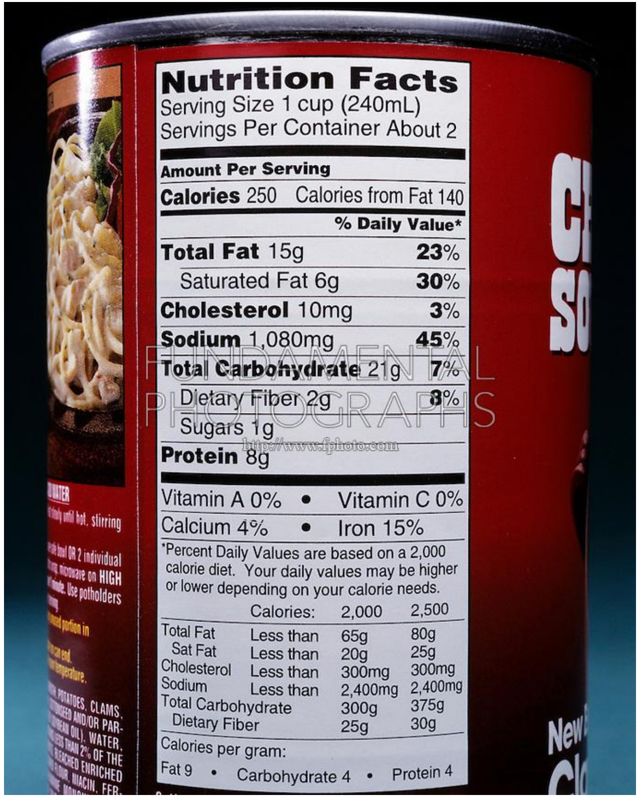
Open Source

Open Source

Docker Image

Open Source

What is an SBOM?



Nutrition Facts
Serving Size 1 cup (240mL)
Servings Per Container About 2

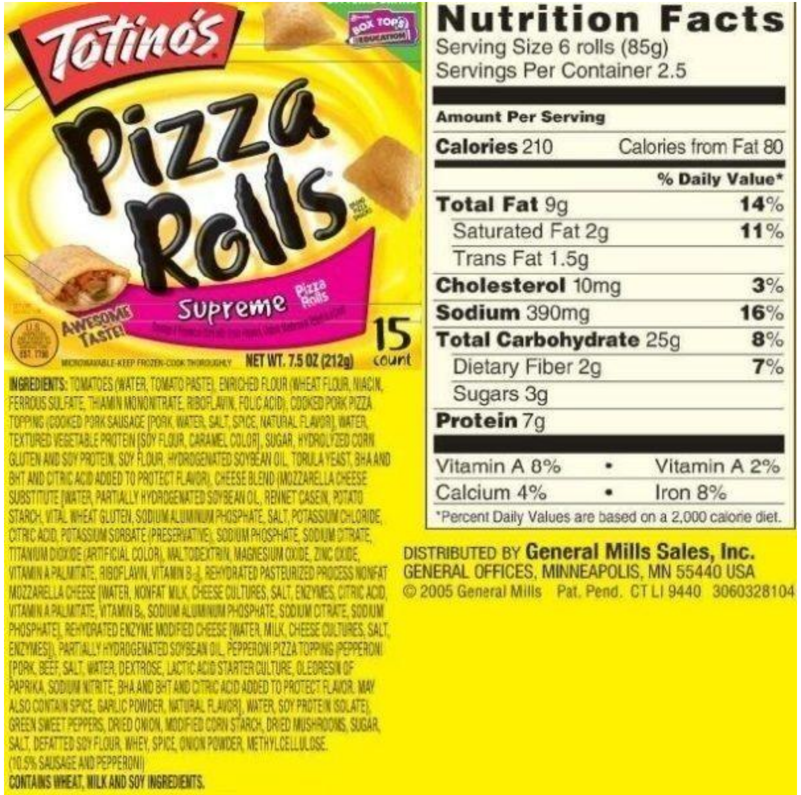
Amount Per Serving	
Calories 250	Calories from Fat 140
	% Daily Value*
Total Fat 15g	**23%**
Saturated Fat 6g	**30%**
Cholesterol 10mg	**3%**
Sodium 1,080mg	**45%**
Total Carbohydrate 21g	**7%**
Dietary Fiber 2g	**8%**
Sugars 1g	
Protein 8g	

Vitamin A 0% • Vitamin C 0%
Calcium 4% • Iron 15%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4



INGREDIENTS: TOMATOES (WATER, TOMATO PASTE), ENRICHED FLOUR (WHEAT FLOUR, NIACIN, FERROUS SULFATE, THIAMIN MONONITRATE, RIBOFLAVIN, FOLIC ACID), COOKED PORK PIZZA TOPPING (COOKED PORK SAUSAGE [PORK, WATER, SALT, SPICE, NATURAL FLAVOR], WATER, TEXTURED VEGETABLE PROTEIN [SOY FLOUR, CARAMEL COLOR], SUGAR, HYDROLYZED CORN GLUTEN AND SOY PROTEIN, SOY FLOUR, HYDROGENATED SOYBEAN OIL, TORULA YEAST, BHA AND BHT AND CITRIC ACID ADDED TO PROTECT FLAVOR), CHEESE BLEND (MOZZARELLA CHEESE SUBSTITUTE [WATER, PARTIALLY HYDROGENATED SOYBEAN OIL, RENNET CASEIN, POTATO STARCH, VITAL WHEAT GLUTEN, SODIUM ALUMINUM PHOSPHATE, SALT, POTASSIUM CHLORIDE, CITRIC ACID, POTASSIUM SORBATE (PRESERVATIVE), SODIUM PHOSPHATE, SODIUM CITRATE, TITANIUM DIOXIDE (ARTIFICIAL COLOR), MALTODEXTRIN, MAGNESIUM OXIDE, ZINC OXIDE, VITAMIN A PALMITATE, RIBOFLAVIN, VITAMIN B_{12}], REHYDRATED PASTEURIZED PROCESS NONFAT MOZZARELLA CHEESE [WATER, NONFAT MILK, CHEESE CULTURES, SALT, ENZYMES, CITRIC ACID, VITAMIN A PALMITATE, VITAMIN B_{12}, SODIUM ALUMINUM PHOSPHATE, SODIUM CITRATE, SODIUM PHOSPHATE], REHYDRATED ENZYME MODIFIED CHEESE [WATER, MILK, CHEESE CULTURES, SALT, ENZYMES]), PARTIALLY HYDROGENATED SOYBEAN OIL, PEPPERONI PIZZA TOPPING (PEPPERONI [PORK, BEEF, SALT, WATER, DEXTROSE, LACTIC ACID STARTER CULTURE, OLEORESIN OF PAPRIKA, SODIUM NITRITE, BHA AND BHT AND CITRIC ACID ADDED TO PROTECT FLAVOR. MAY ALSO CONTAIN SPICE, GARLIC POWDER, NATURAL FLAVOR], WATER, SOY PROTEIN ISOLATE), GREEN SWEET PEPPERS, DRIED ONION, MODIFIED CORN STARCH, DRIED MUSHROOMS, SUGAR, SALT, DEFATTED SOY FLOUR, WHEY, SPICE, ONION POWDER, METHYLCELLULOSE. (10.5% SAUSAGE AND PEPPERONI)
CONTAINS WHEAT, MILK AND SOY INGREDIENTS.

Nutrition Facts
Serving Size 6 rolls (85g)
Servings Per Container 2.5

Amount Per Serving	
Calories 210	Calories from Fat 80
	% Daily Value*
Total Fat 9g	**14%**
Saturated Fat 2g	**11%**
Trans Fat 1.5g	
Cholesterol 10mg	**3%**
Sodium 390mg	**16%**
Total Carbohydrate 25g	**8%**
Dietary Fiber 2g	**7%**
Sugars 3g	
Protein 7g	

Vitamin A 8% • Vitamin A 2%
Calcium 4% • Iron 8%

*Percent Daily Values are based on a 2,000 calorie diet.

DISTRIBUTED BY **General Mills Sales, Inc.**
GENERAL OFFICES, MINNEAPOLIS, MN 55440 USA
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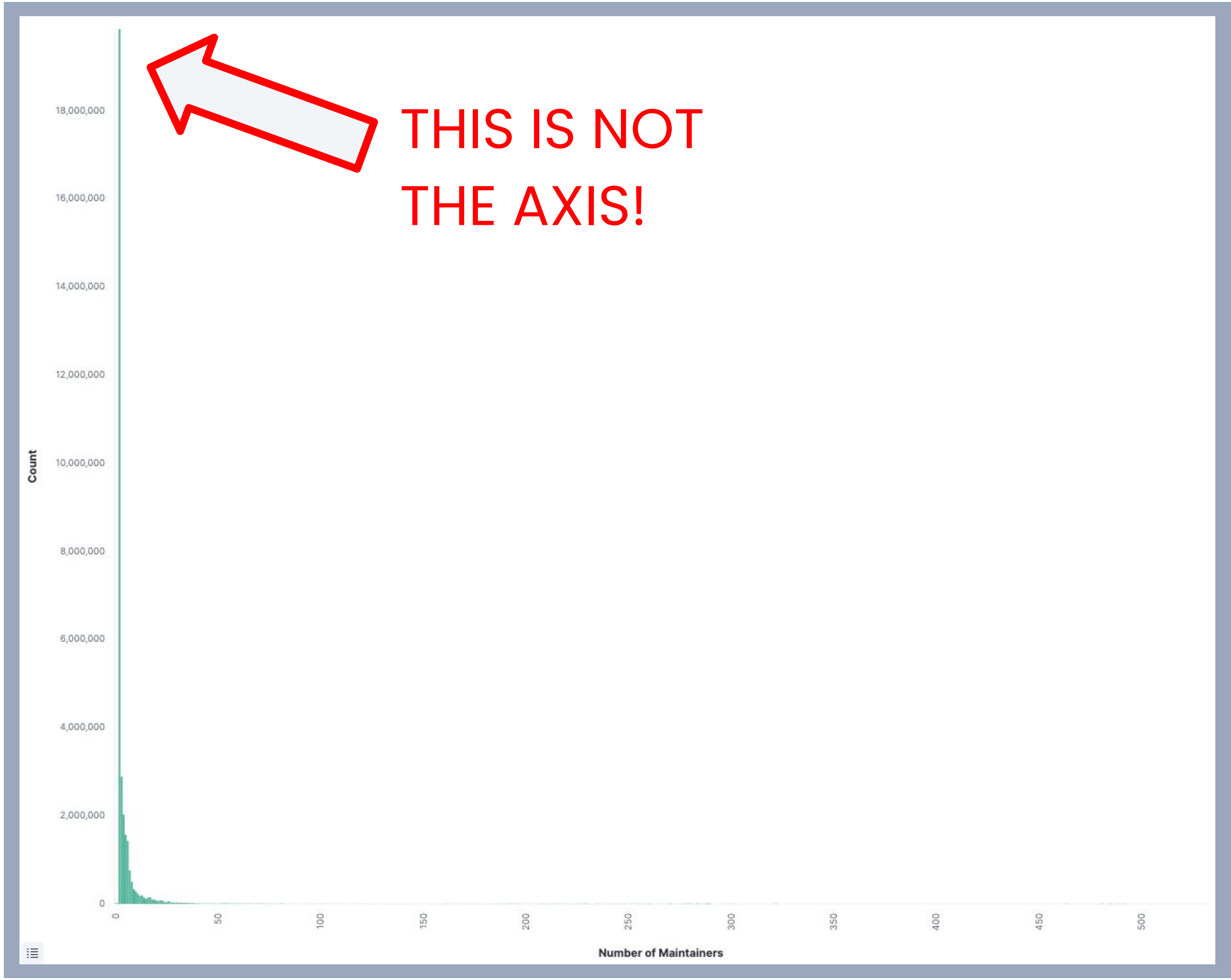
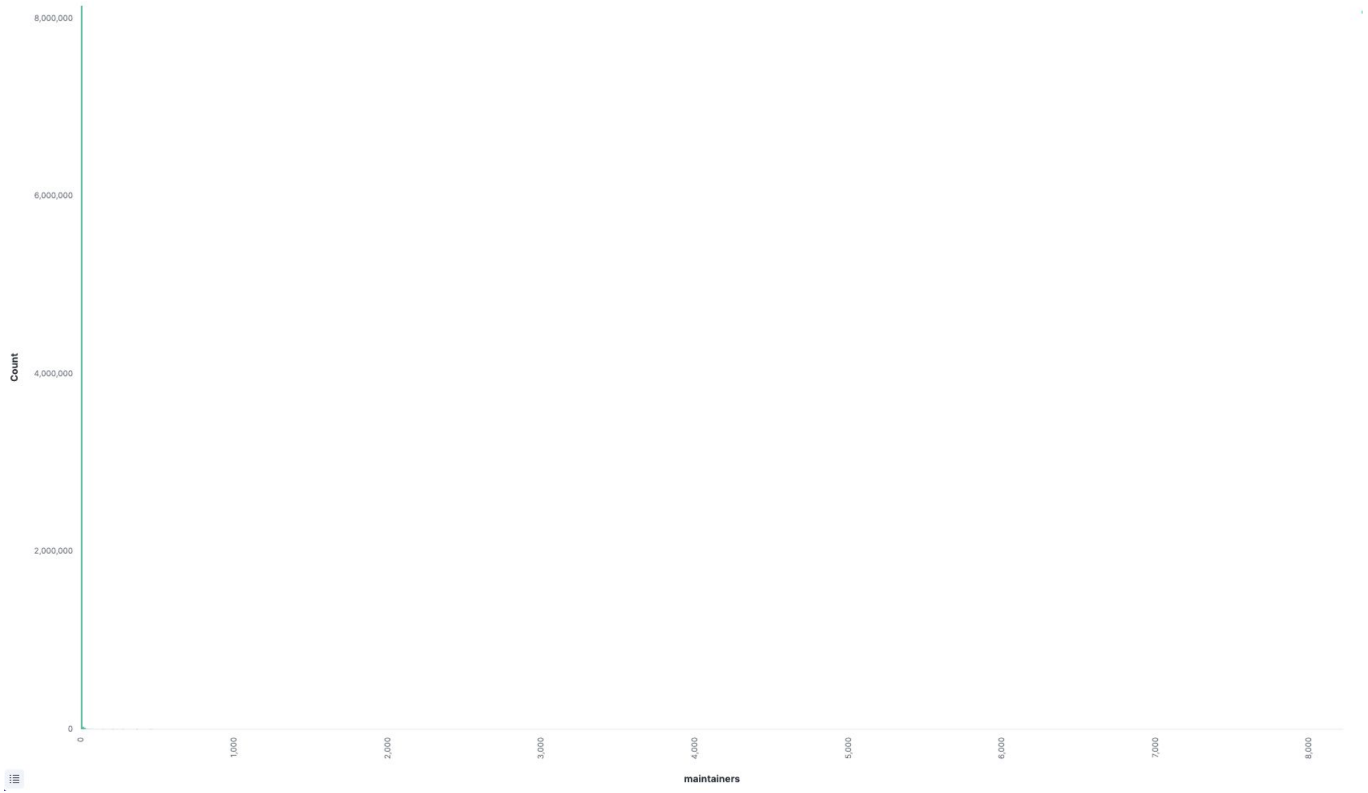
An Example Project Health Metric:

Number of Maintainers

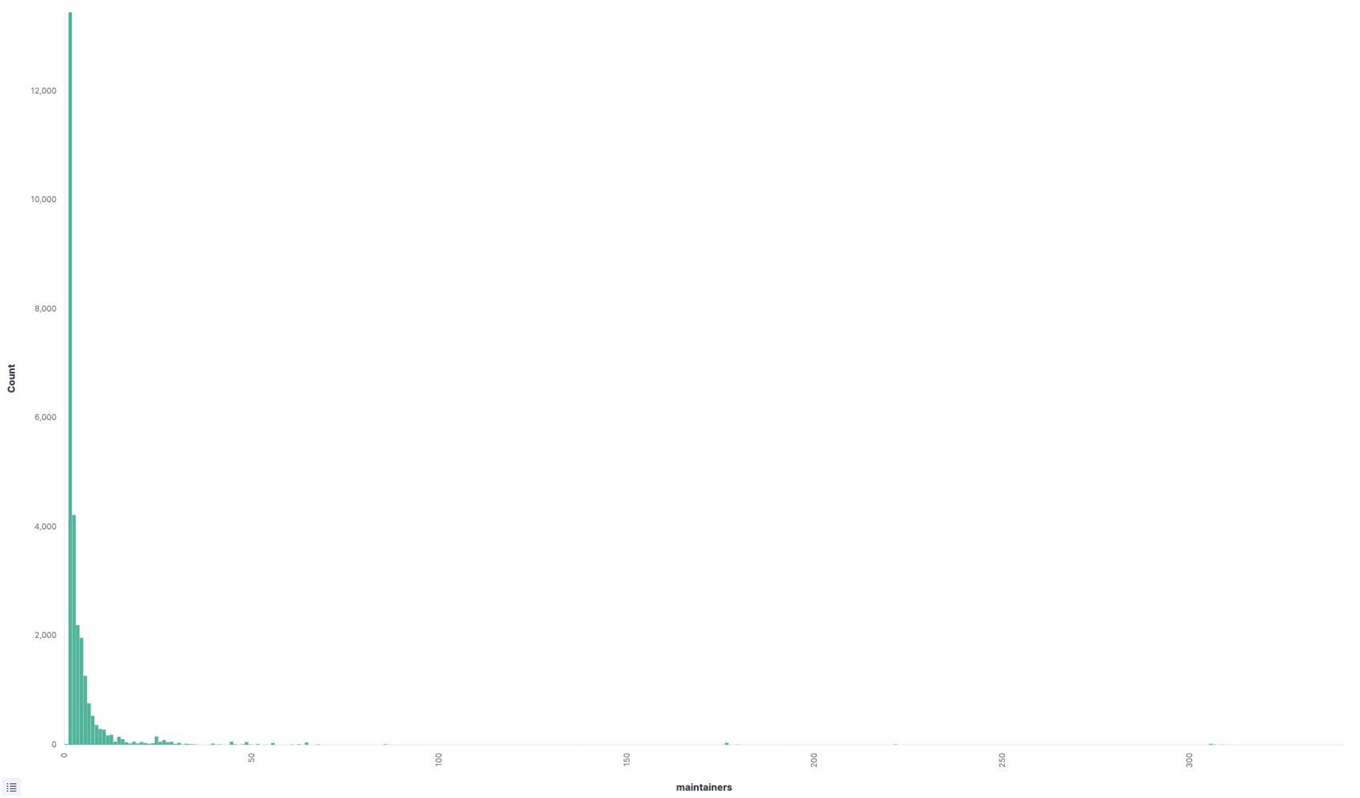


THIS IS NOT THE AXIS!

How many people are maintaining these things?



> 100,000 downloads



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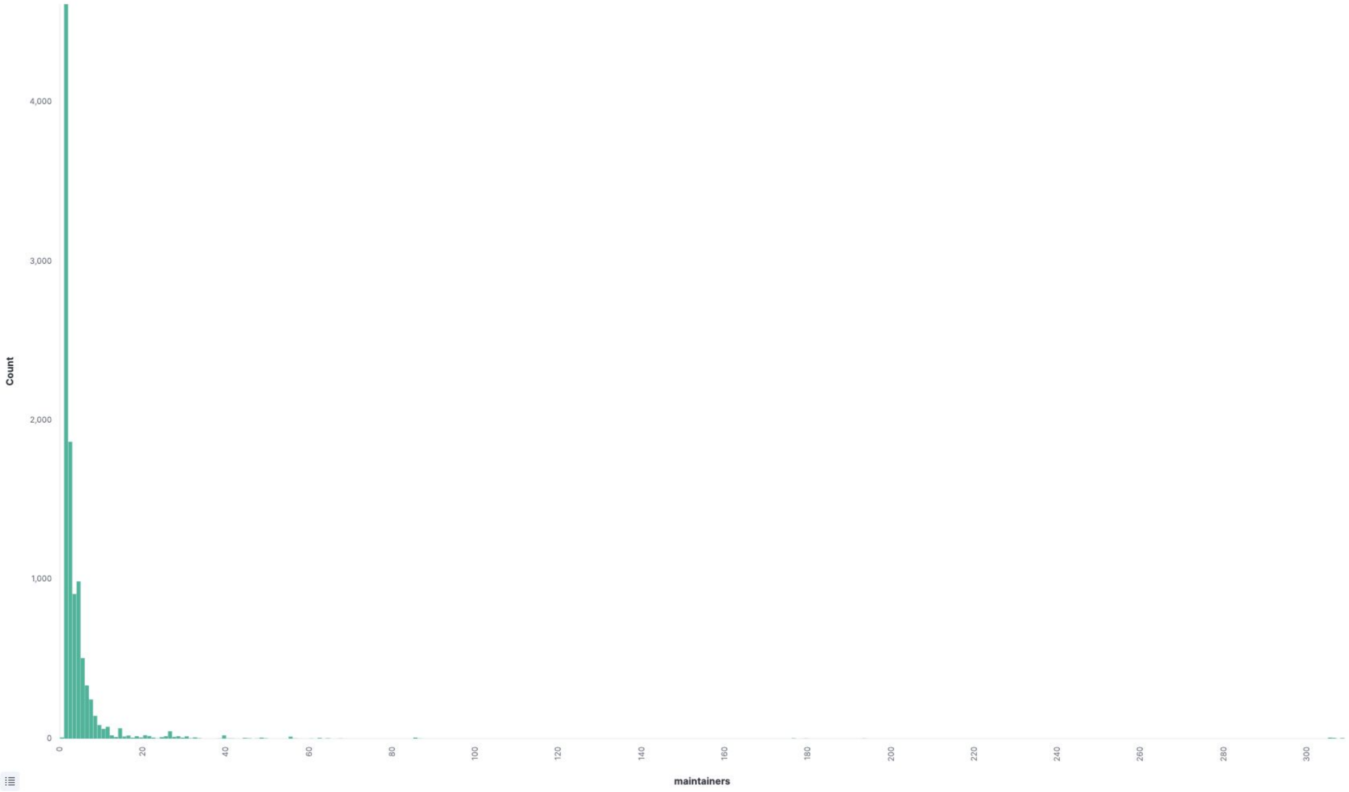
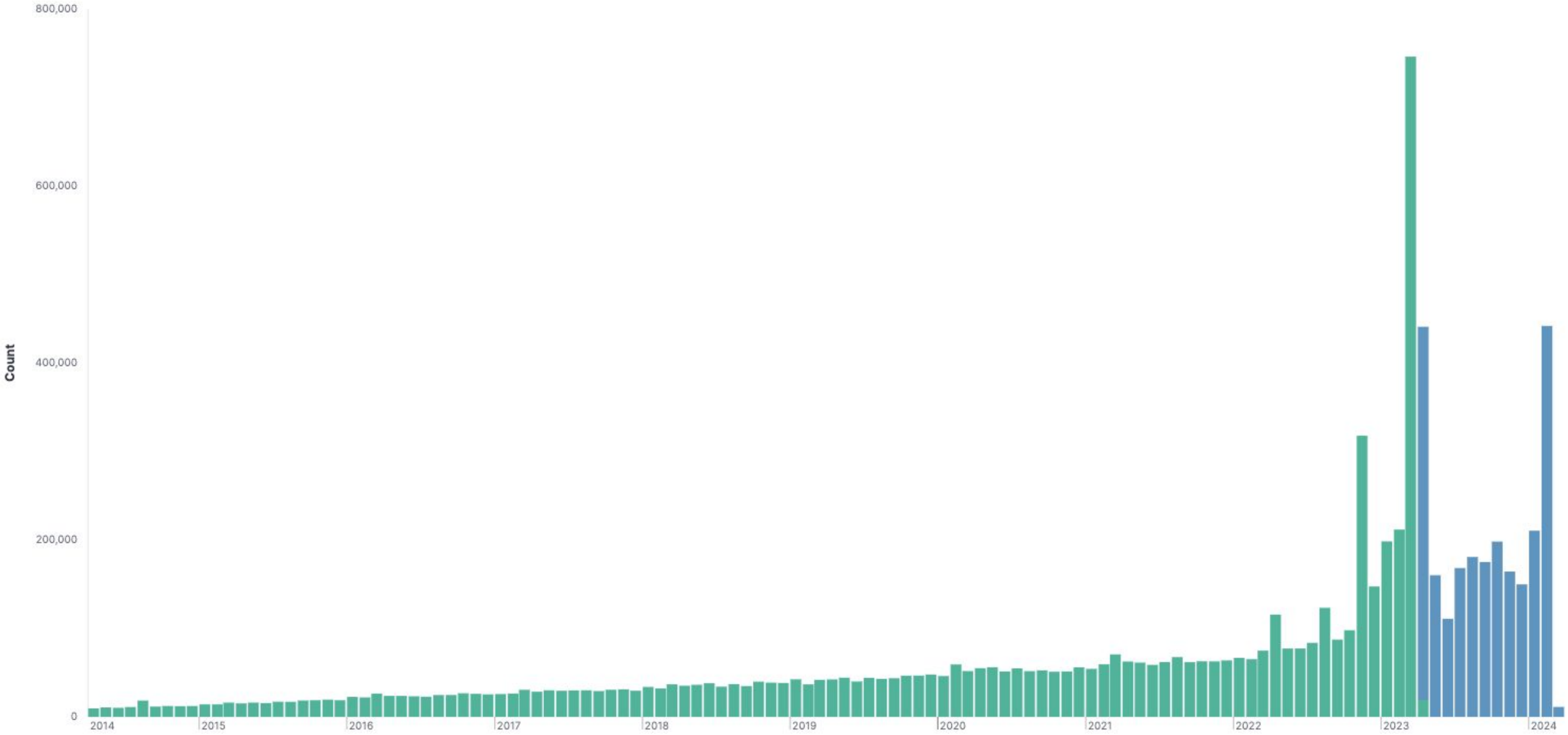
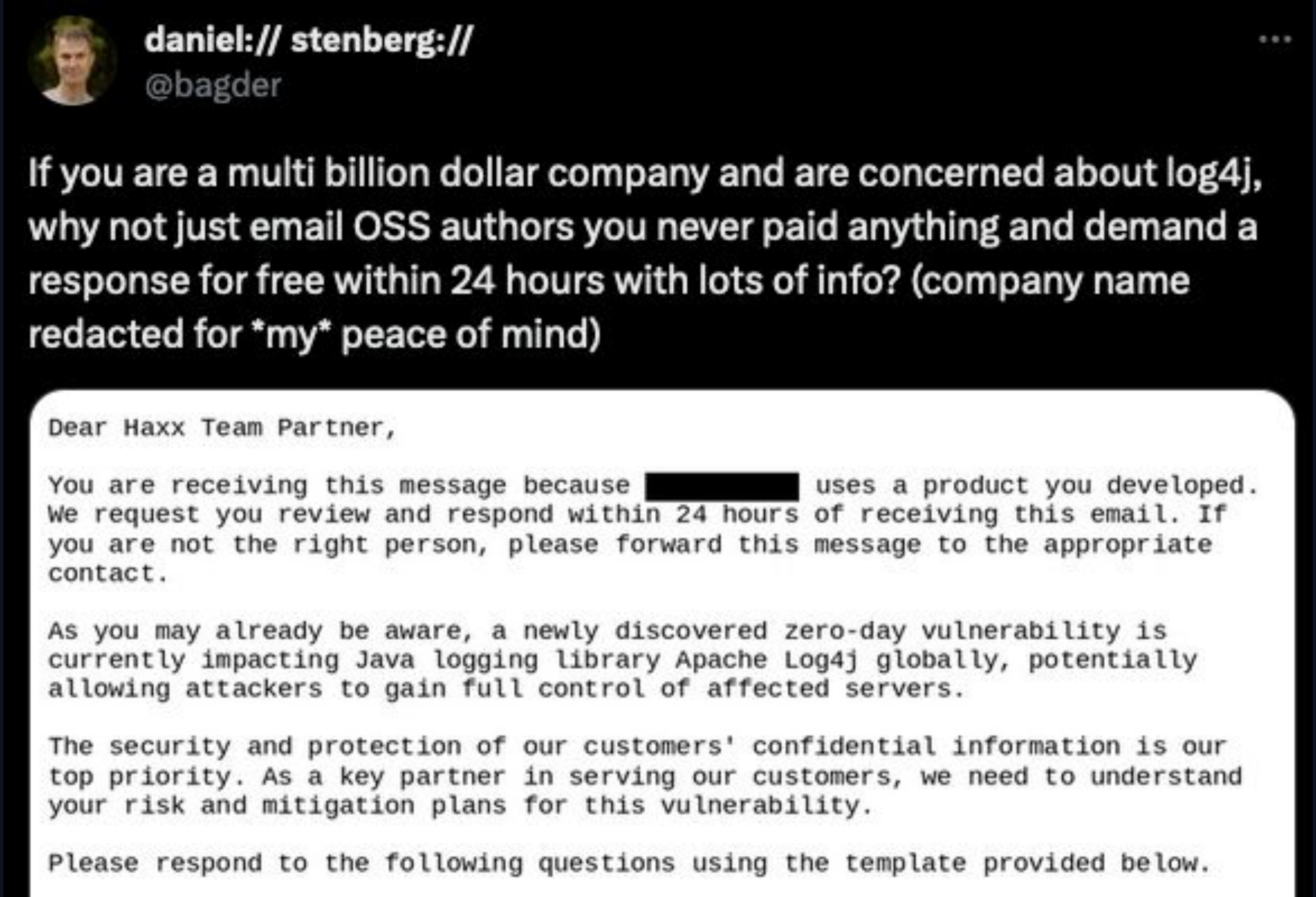
> 1,000,000 downloads



How many packages are more than a year old?





daniel:// stenberg://
@bagder

If you are a multi billion dollar company and are concerned about log4j, why not just email OSS authors you never paid anything and demand a response for free within 24 hours with lots of info? (company name redacted for *my* peace of mind)

Dear Haxx Team Partner,

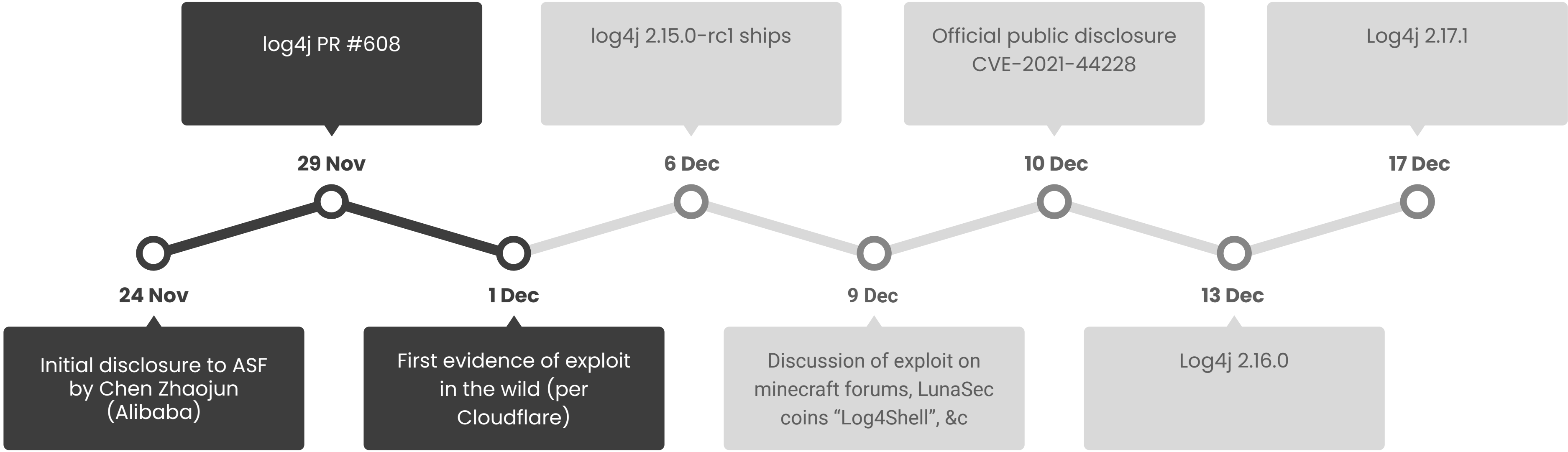
You are receiving this message because [redacted] uses a product you developed. We request you review and respond within 24 hours of receiving this email. If you are not the right person, please forward this message to the appropriate contact.

As you may already be aware, a newly discovered zero-day vulnerability is currently impacting Java logging library Apache Log4j globally, potentially allowing attackers to gain full control of affected servers.

The security and protection of our customers' confidential information is our top priority. As a key partner in serving our customers, we need to understand your risk and mitigation plans for this vulnerability.

Please respond to the following questions using the template provided below.

log4shell Timeline



24 Nov

Initial disclosure to ASF by Chen Zhaojun (Alibaba)

29 Nov

log4j PR #608

1 Dec

First evidence of exploit in the wild (per Cloudflare)

6 Dec

log4j 2.15.0-rc1 ships

9 Dec

Discussion of exploit on minecraft forums, LunaSec coins “Log4Shell”, &c

10 Dec

Official public disclosure CVE-2021-44228

13 Dec

Log4j 2.16.0

17 Dec

Log4j 2.17.1

Stop thinking about open source like a vendor

This

Not this

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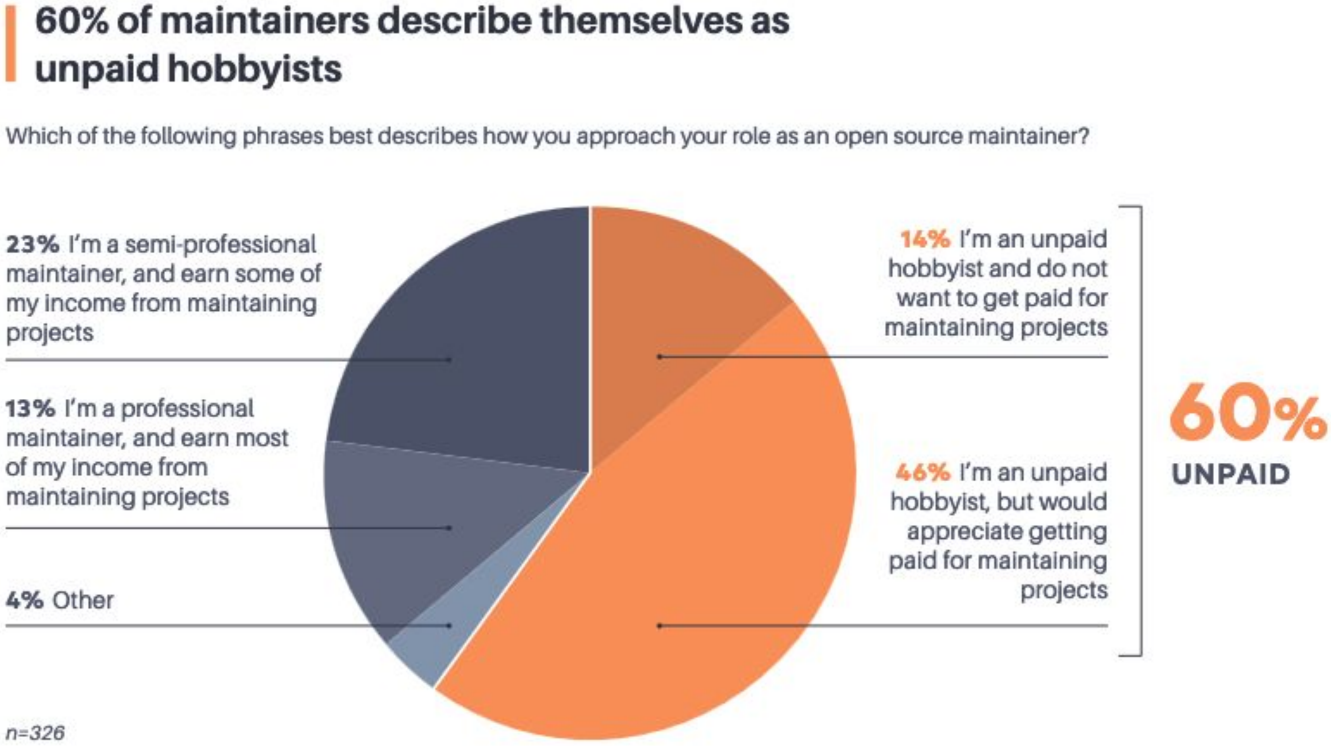
Who is doing this?



60% of maintainers describe themselves as unpaid hobbyists

Which of the following phrases best describes how you approach your role as an open source maintainer?

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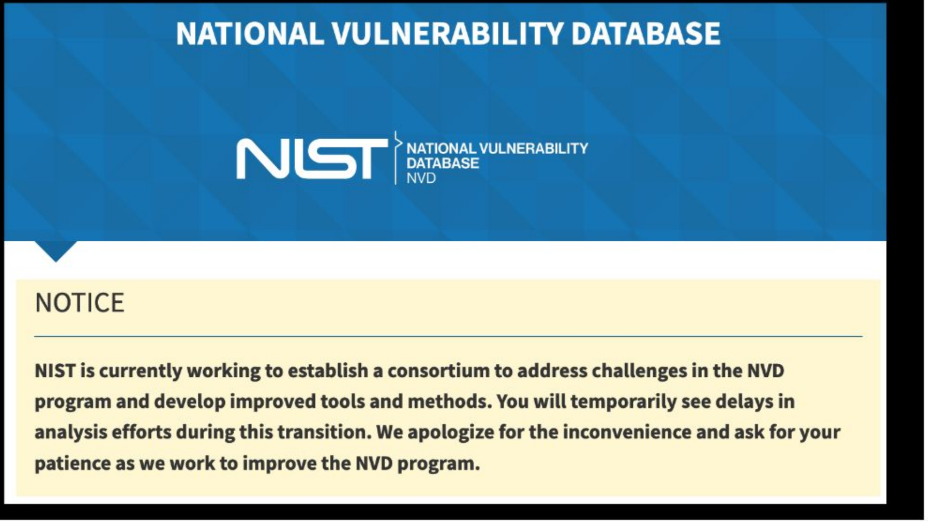
Credit: Tidelift 2023 Open Source Maintainer Survey

Summary of Software Supply Chains

- Red Hat is a supplier - they assume responsibility in exchange for money
- npm is NOT a supplier
- A lot of critical plumbing is maintained by unpaid guys who have day jobs, take vacations, etc.

Breaking News

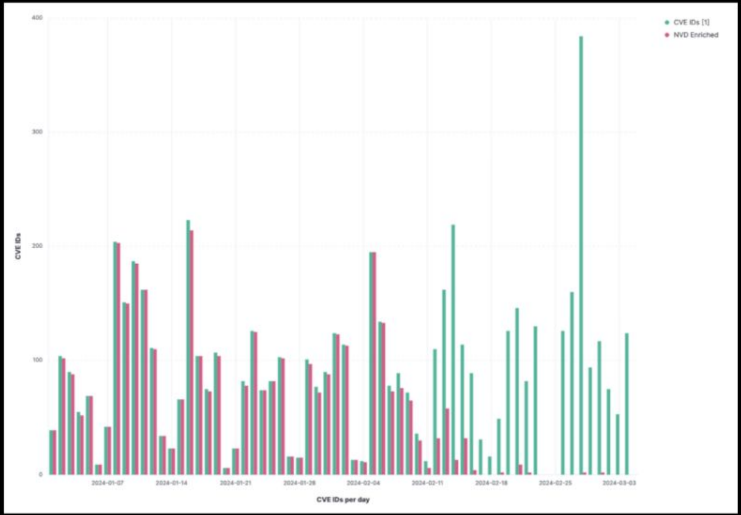


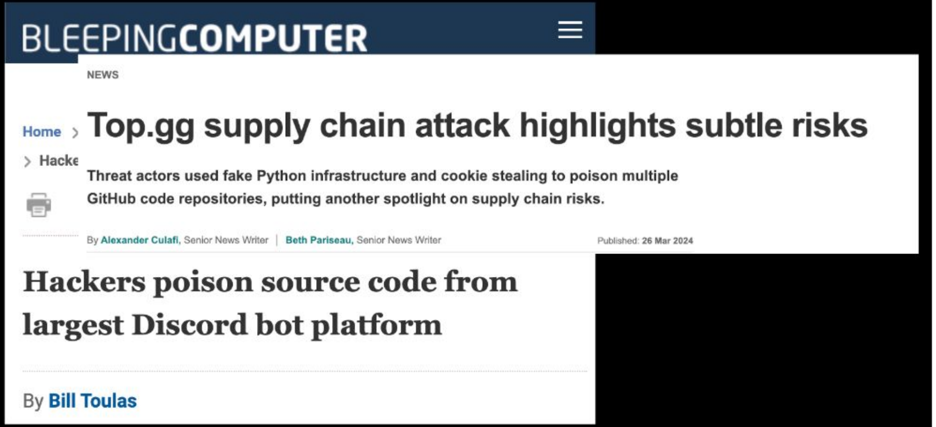
NATIONAL VULNERABILITY DATABASE

NIST NATIONAL VULNERABILITY DATABASE NVD

NOTICE

NIST is currently working to establish a consortium to address challenges in the NVD program and develop improved tools and methods. You will temporarily see delays in analysis efforts during this transition. We apologize for the inconvenience and ask for your patience as we work to improve the NVD program.





BLEEPINGCOMPUTER

NEWS

Top.gg supply chain attack highlights subtle risks

Threat actors used fake Python infrastructure and cookie stealing to poison multiple GitHub code repositories, putting another spotlight on supply chain risks.

By Alexander Culafi, Senior News Writer | Beth Pariseau, Senior News Writer

Published: 26 Mar 2024

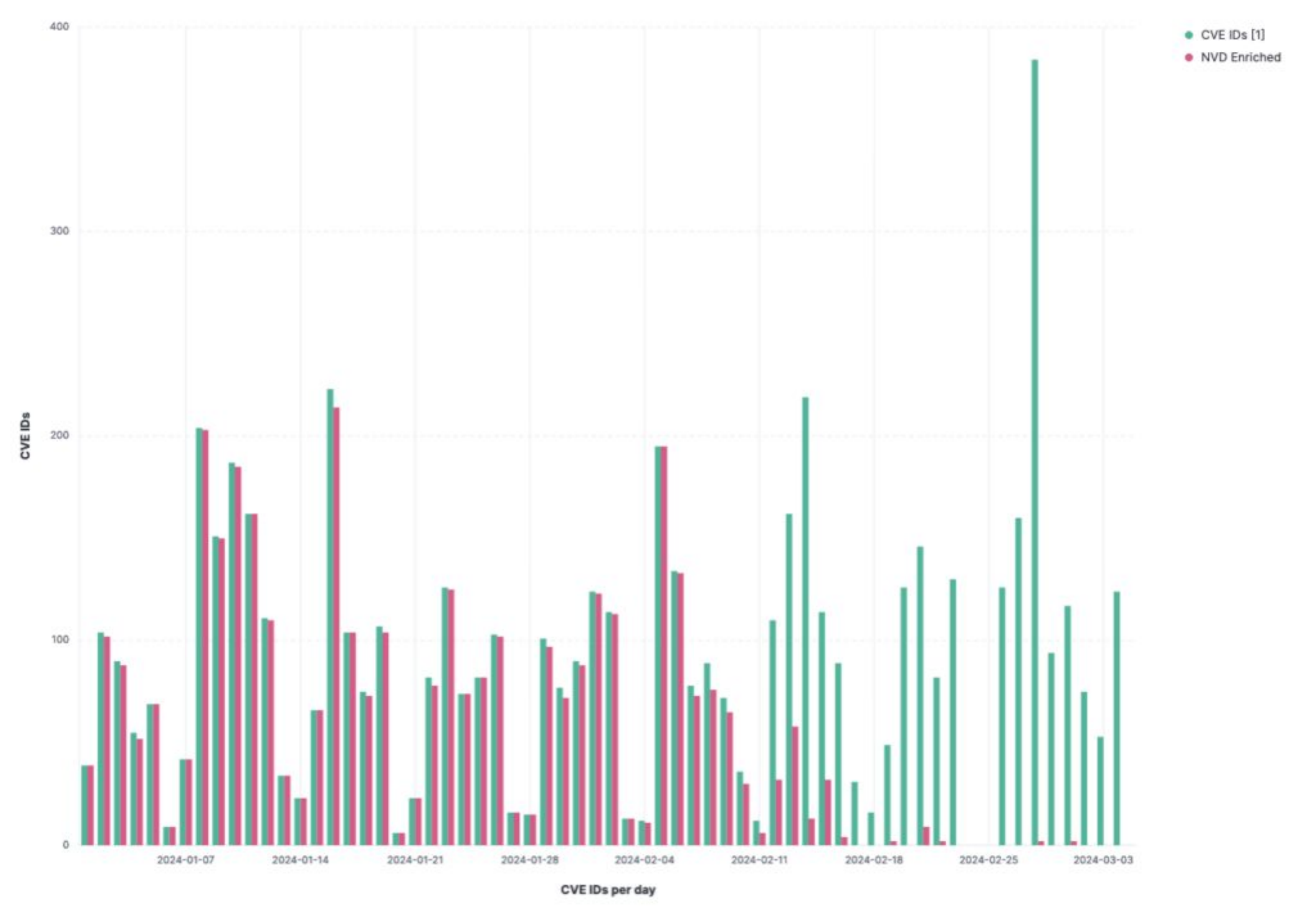
Home > Hacke

Hackers poison source code from largest Discord bot platform

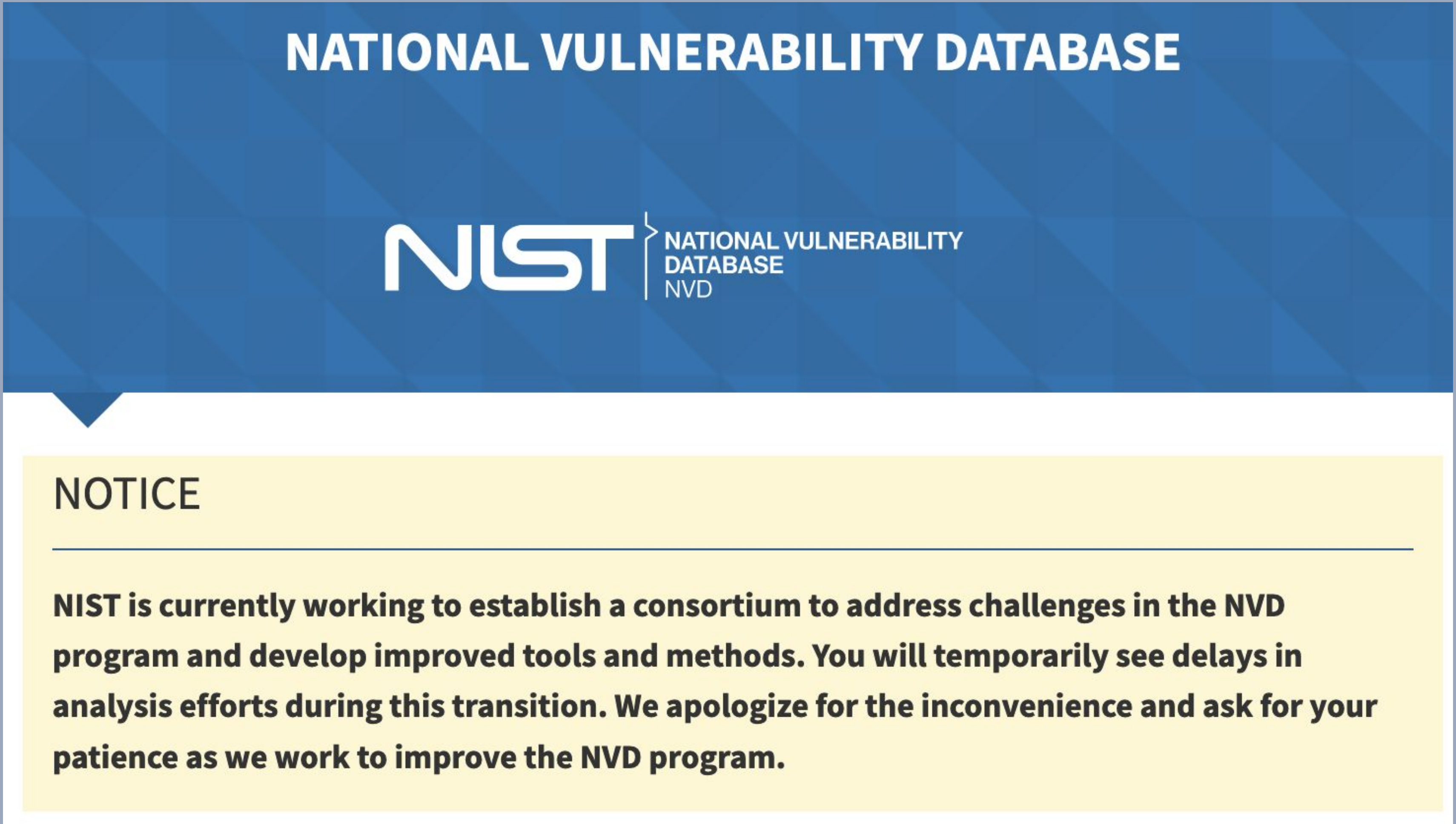
By Bill Toulas

March 2024 was wild

- NVD Chaos (started mid-Feb, noticed early March)
- top.gg python-sdk poisoned (discovered mid March)
- xz backdoor (discovered late March)



CVE IDs [1]
NVD Enriched
400
300
200
100
0
CVE IDs
2024-01-07
2024-01-14
2024-01-21
2024-01-28
2024-02-04
2024-02-11
2024-02-18
2024-02-25
2024-03-03
CVE IDs per day



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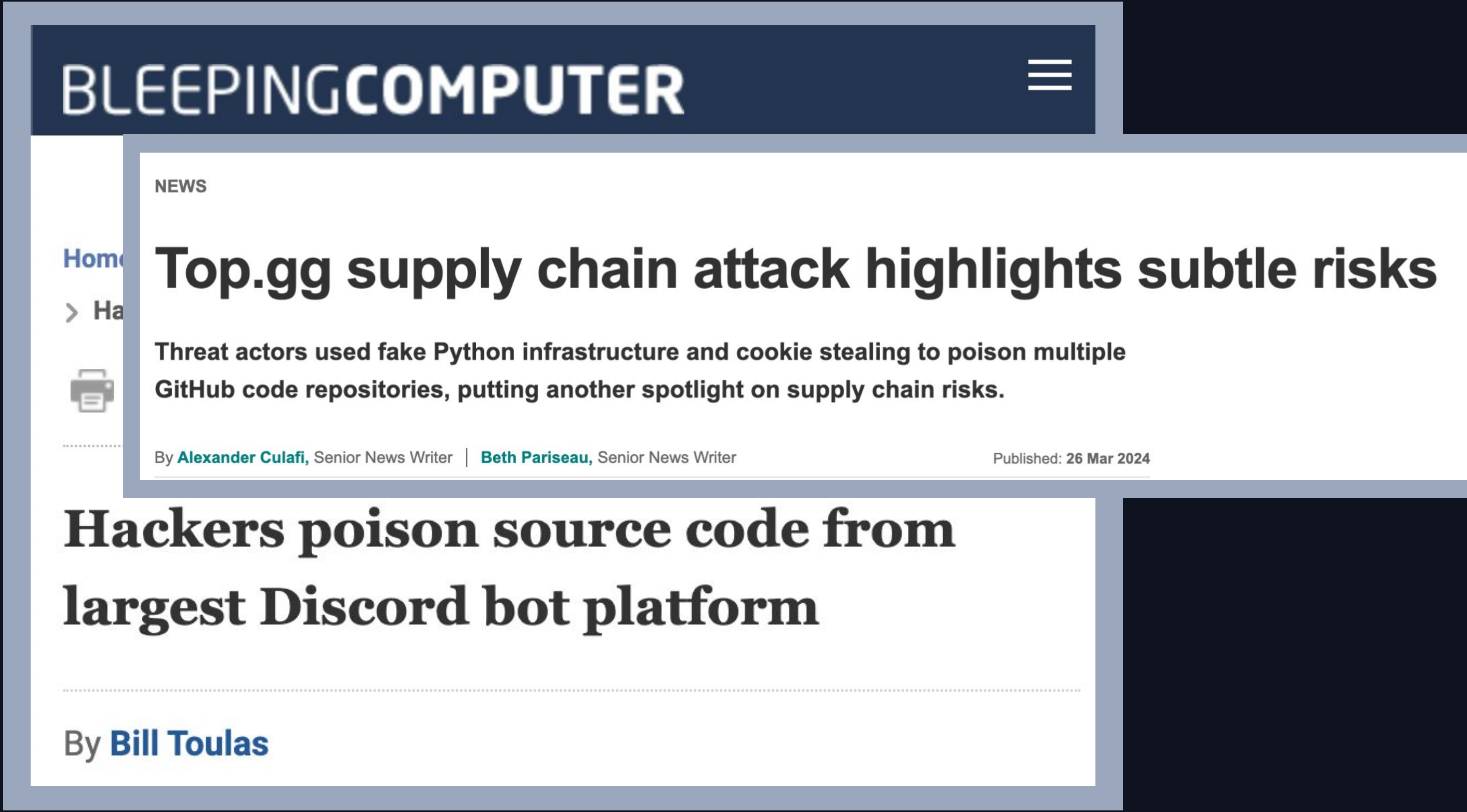

BLEEPINGCOMPUTER

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> Ha

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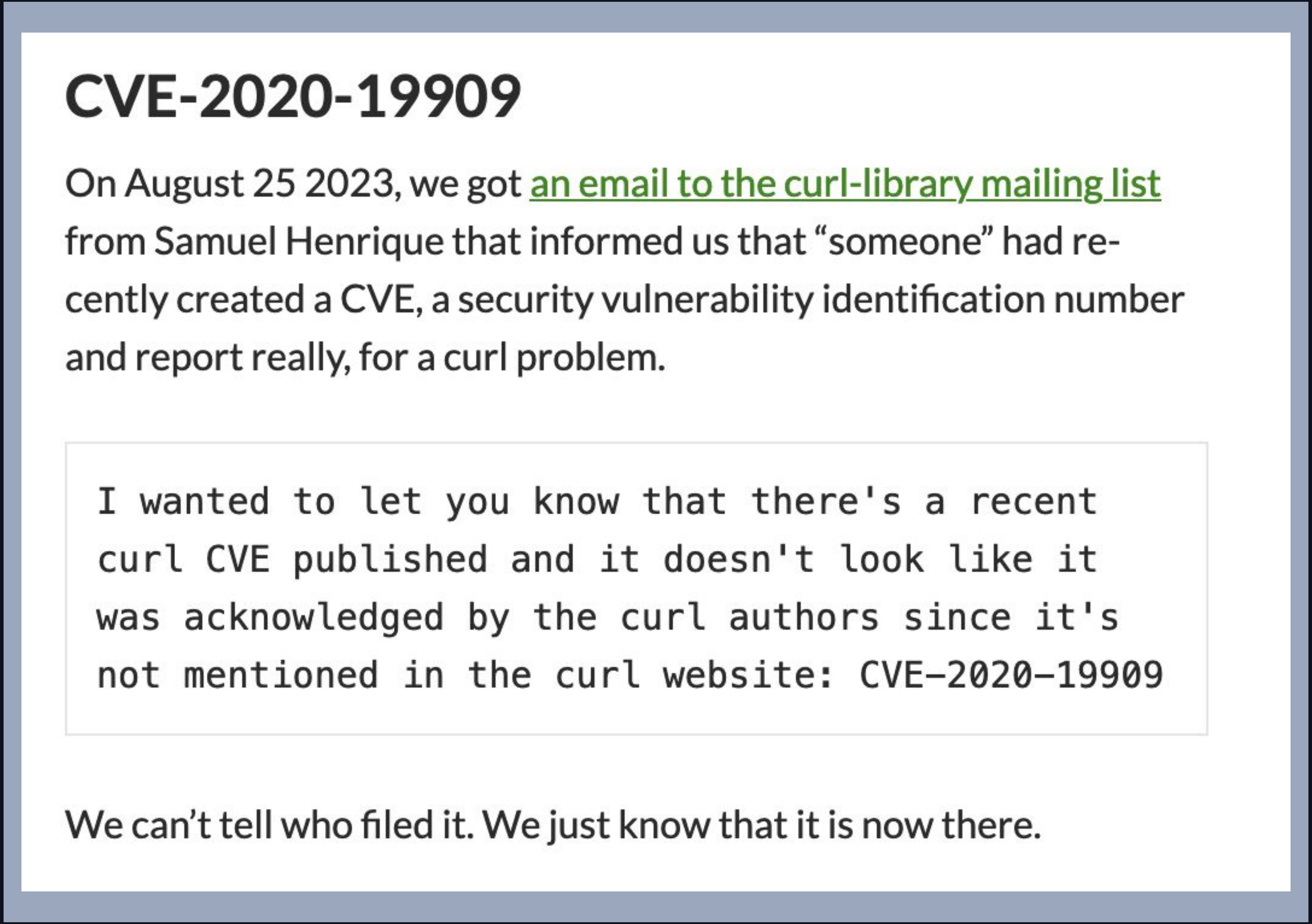
Threat actors used fake Python infrastructure and cookie stealing to poison multiple GitHub code repositories, putting another spotlight on supply chain risks.

By **Alexander Culafi,** Senior News Writer | **Beth Pariseau,** Senior News Writer

Published: **26 Mar 2024**

♡ JIA TAN ♡
X2

Three Big Things



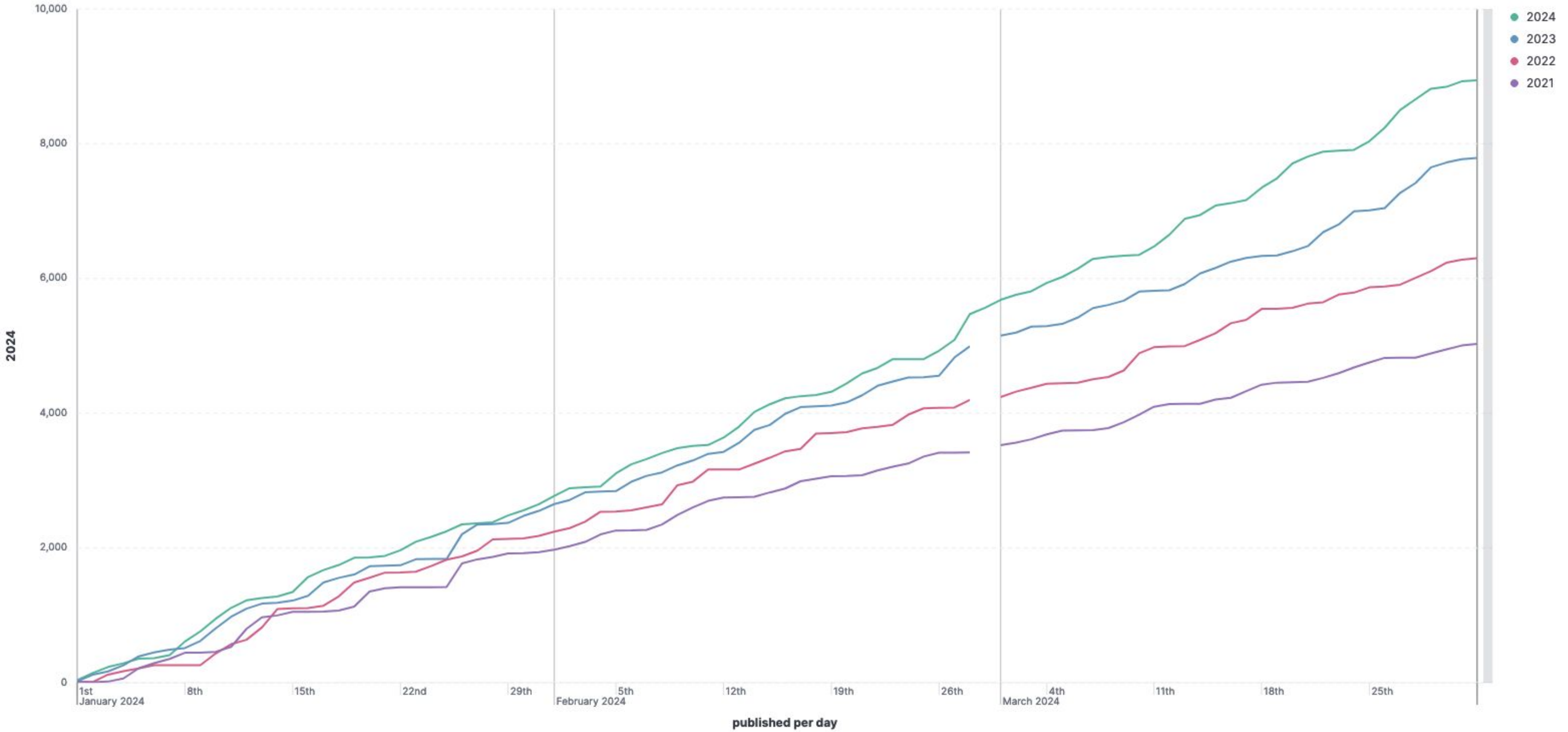
CVE-2020-19909

On August 25 2023, we got an email to the curl-library mailing list from Samuel Henrique that informed us that “someone” had recently created a CVE, a security vulnerability identification number and report really, for a curl problem.

```
I wanted to let you know that there's a recent
curl CVE published and it doesn't look like it
was acknowledged by the curl authors since it's
not mentioned in the curl website: CVE-2020-19909
```

We can’t tell who filed it. We just know that it is now there.

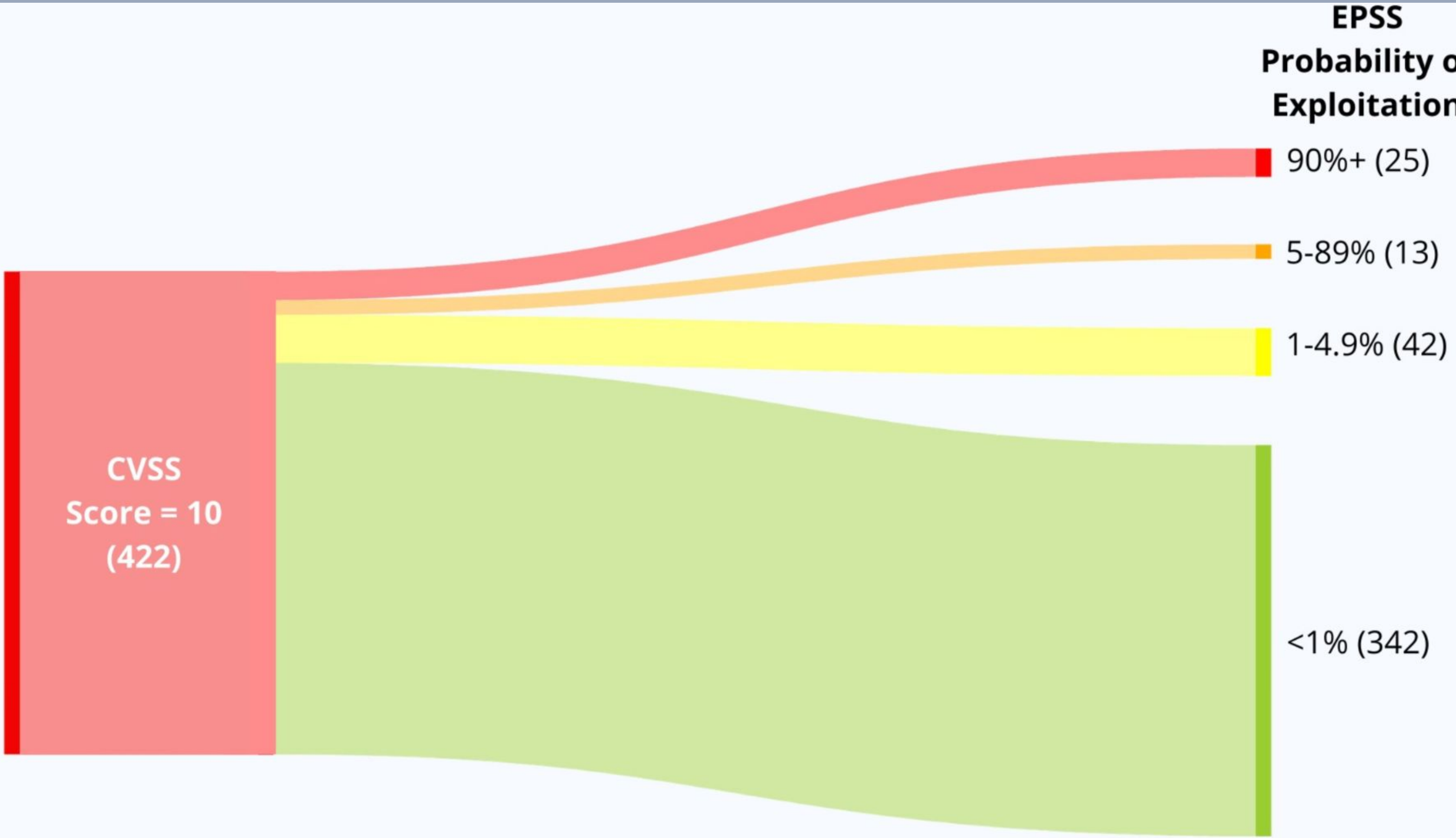
CVE by year



10,000
8,000
6,000
4,000
2,000
0
2024
1st
January 2024
8th
15th
22nd
29th
5th
February 2024
12th
19th
26th
4th
March 2024
11th
18th
25th
published per day
● 2024
● 2023
● 2022
● 2021

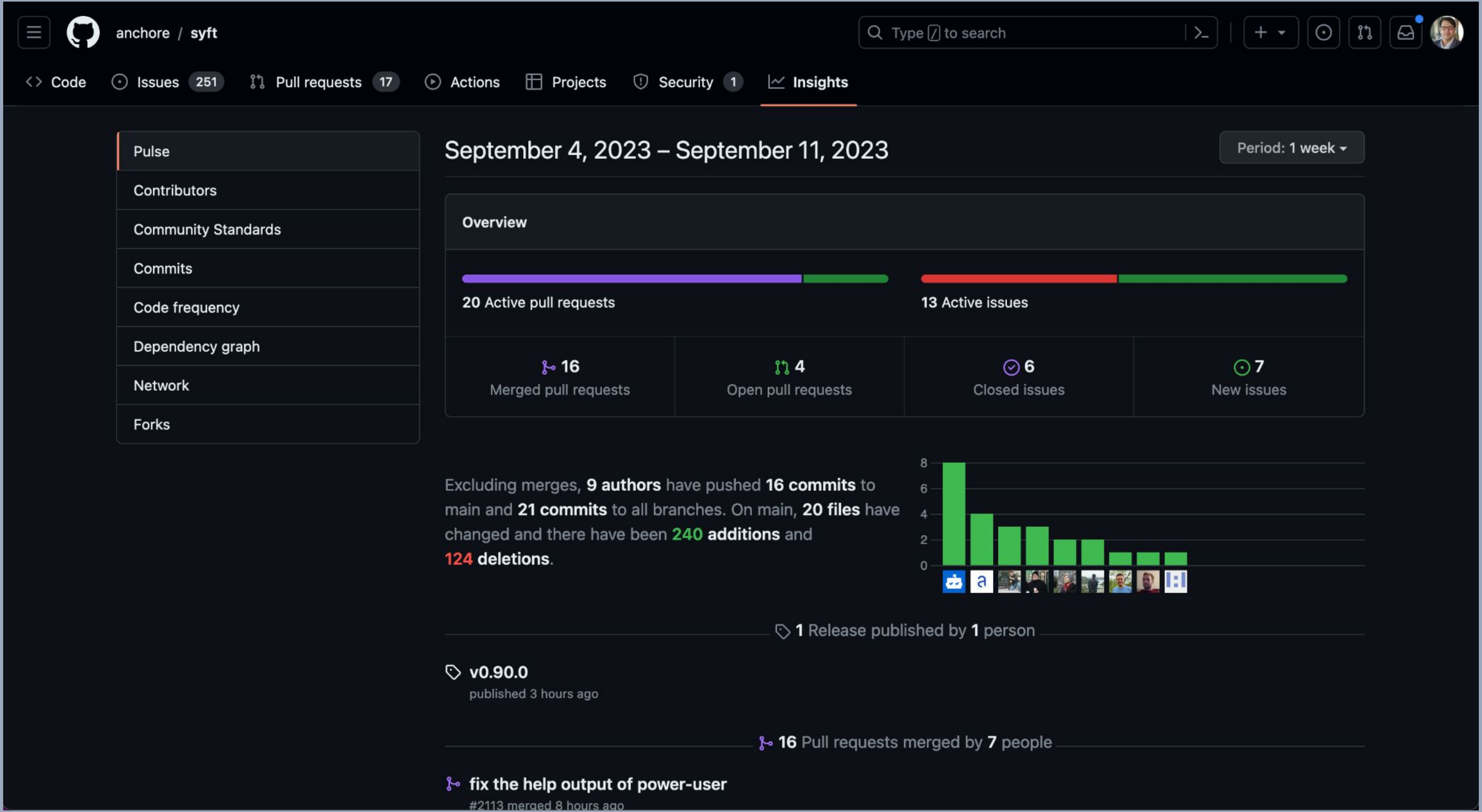
Big Thing #1: If Not CVE/CVSS, Then What?

- GHSAs (more transparent than CVEs)
- CISA KEV, EPSS, VEX, CSAF, &c
- OpenSSF Malicious Packages Repository
- GitHub Insights and other project health metrics
    - This is (currently) a very manual process
    - But it’s getting a lot easier


EPSS Probability of Exploitation
CVSS Score = 10 (422)
90%+ (25)
5-89% (13)
1-4.9% (42)
<1% (342)

Big Thing #2: Project Health/Insights

- This is PROACTIVE (the better advisory data, scoring etc is about reactive improvements)
- This is (currently) a manual process (getting easier)
- Evaluating project health isn't directly about safety, it's about tracking all of those deps in the iceberg,
- Are the projects you're depending on healthy, will you be able to work with them?



September 4, 2023 – September 11, 2023

Overview

20 Active pull requests

13 Active issues

16	4	6	7
Merged pull requests	Open pull requests	Closed issues	New issues

Excluding merges, **9 authors** have pushed **16 commits** to main and **21 commits** to all branches. On main, **20 files** have changed and there have been **240 additions** and **124 deletions**.

1 Release published by **1** person

v0.90.0
published 3 hours ago

16 Pull requests merged by **7** people

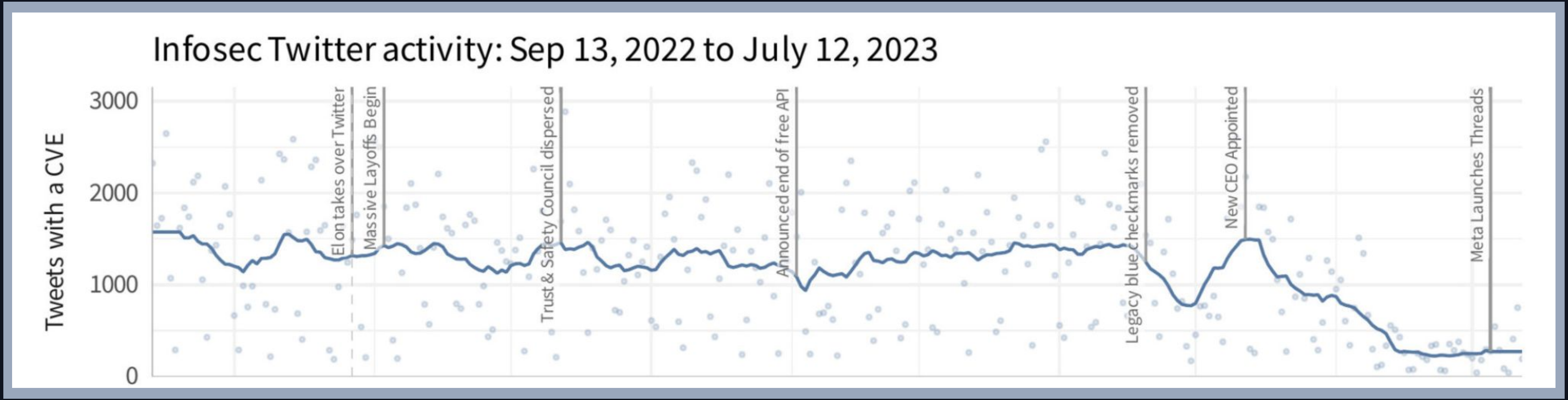
fix the help output of power-user
#2113 merged 8 hours ago

Big Thing #3: Supply Chain Attacks Ascendant

- Open Source has gotten so big that opportunistic, financially-motivated attackers are extremely incentivized to focus on it
- Supply chain attacks are reusable
- Even state-sponsored attackers can’t ignore it
- Scale means that it’s often useful even to get to particular targets

Bonus Thing: Infosec Twitter is Dead

- Twitter was incredibly central to Log4Shell reaction, forming consensus, and generally just figuring out what was happening
- If log4shell dropped today, this reaction/recovery would be notably worse because of infosec splintering to (e.g.) mastodon, linkedin, bsky, threads
- None of these networks have the critical mass that Twitter had and it doesn’t seem to be improving



Infosec Twitter activity: Sep 13, 2022 to July 12, 2023

This seems really bad

1. Well it’s not great
2. But things are mostly working OK
3. Open source adapts

Open source is different

There’s nothing wrong with open source, this is how it works

There’s something wrong with what we expect from open source

Big Changes

1. Better metrics and data sources are coming
2. Tracking dependencies is more proactive
3. Supply chain attacks are here to stay
4. Twitter is Over

Call to Action

SBOM Everywhere: https://github.com/ossf/sbom-everywhere
I don’t know what the end game is but generating them is better than nothing, figure out the details later
The (first two) “big things” are still very embryonic and probably not ready for prime time but tools are starting to adopt a lot of this

SBOMs: https://github.com/anchore/syft
Vulnerabilities: https://github.com/anchore/grype
Webinars: https://anchore.com/webinars/

Recap

- Log4Shell is radioactive and immortal
- How software gets made has changed
- We don’t know what’s in our software
- We don’t know who is supplying it
- We have to change how we evaluate it
- GitHub is uniquely positioned
- Try to be proactive

Q&A

Our open source projects:

https://github.com/anchore/syft
https://github.com/anchore/grype
https://github.com/anchore/grant

Get an invite to our open source community Slack:
https://anchore.com/slack/

These slides are archived:
https://github.com/pvnovarese/2024-04-legacy-of-log4shell

Notes, &c.

Footnotes

Package data - https://ecosyste.ms/
Open Source is Bigger Than You Can Imagine - https://anchore.com/blog/open-source-is-bigger-than-you-imagine/
log4j survey etc - https://anchore.com/log4j/
Half Day Vulnerabilities - https://github.com/Aqua-Nautilus/CVE-Half-Day-Watcher
The Death of Infosec Twitter - https://www.cyentia.com/the-death-of-infosec-twitter/
possible origin of the iceberg - https://www.slideshare.net/loriayre/open-source-library-system-software-free-is-just-the-tip-of-the-iceberg
Log4Shell logo: https://en.wikipedia.org/wiki/File:Log4Shell_logo.png
xz logo: https://infosec.exchange/@jerry/112186387514069376

Log4Shell's immortality:
https://www.zdnet.com/article/log4j-flaw-why-it-will-still-be-causing-problems-a-decade-from-now/
https://securityintelligence.com/articles/log4j-downloads-vulnerable/

Patrick Garrity discussing EPSS and Improved Metrics:
https://www.linkedin.com/posts/patrickmgarrity_the-evolution-of-patricks-sankey-matics-activity-7118334146728357888-zxxn/

Various tweets &c:
https://twitter.com/CubicleApril/status/1469825942684160004
https://www.linkedin.com/posts/novarese_log4j-log4shell-activity-6876206319238463488-8bEA
https://twitter.com/bagder/status/1484672924036616195
https://lists.haxx.se/pipermail/daniel/2023-September/000032.html

Projects and Data Sources

OpenSSF Malicious Packages Repository:
https://openssf.org/blog/2023/10/12/introducing-openssfs-malicious-packages-repository/

Common Security Advisory Framework:
https://oasis-open.github.io/csaf-documentation/

Exploit Prediction Scoring System:
https://www.first.org/epss/

CISA Known Exploited Vulnerability Catalog:
https://www.cisa.gov/known-exploited-vulnerabilities-catalog

Vulnerability Exploitability Exchange:
https://cyclonedx.org/capabilities/vex/

GitHub Advisory Database:
https://github.com/advisories

GitHub Insights:
https://docs.github.com/en/issues/planning-and-tracking-with-projects/viewing-insights-from-your-project/about-insights-for-projects

Open Source Insights:
https://deps.dev/

Reading List

Filling the NVD data gap
https://github.com/anchore/nvd-data-overrides

NVD Chaos Podcast
https://resilientcyber.substack.com/p/s6e11-josh-bressers-and-dan-lorenc

Identifying Software
https://guix.gnu.org/en/blog/2024/identifying-software/

CVEs CWEs CVSS and It's Discontents:
https://www.linkedin.com/pulse/cves-cwes-cvss-its-discontents-sherif-mansour

Open Source Security Podcast Episode 392 – Curl and the calamity of CVE:
https://opensourcesecurity.io/2023/09/10/episode-392-curl-and-the-calamity-of-cve/

I am not a Supplier::
https://www.softwaremaxims.com/blog/not-a-supplier
https://opensourcesecuritypodcast.libsyn.com/episode-365-i-am-not-your-supplier-with-thomas-depierre

Shedding Light on CVSS Scoring Inconsistencies:
https://arxiv.org/abs/2308.15259

My previous DevOpsDays 2022 talk (Learn From Log4Shell):
https://www.youtube.com/watch?v=PlNtIL_oN0k
https://github.com/pvnovarese/2022-devopsdays

Probably Don't Rely on EPSS Yet:
https://insights.sei.cmu.edu/blog/probably-dont-rely-on-epss-yet/

CVE-2020-19909 is everything that is wrong with CVEs:
https://daniel.haxx.se/blog/2023/08/26/cve-2020-19909-is-everything-that-is-wrong-with-cves/

Do SBOMS Need VEX?:
https://www.linkedin.com/posts/aph10_sbom-softwaresupplychainsecurity-vex-activity-7108017924384137216-VARV/

A Study on Navigating Open-Source Dependency Abandonment:
https://courtney-e-miller.github.io/static/media/WeFeelLikeWereWingingIt.dc3c76d3b3c2d12f4fee.pdf

xz Reading List

Technologist vs spy: the xz backdoor debate
https://lcamtuf.substack.com/p/technologist-vs-spy-the-xz-backdoor

General xz roundups
https://boehs.org/node/everything-i-know-about-the-xz-backdoor
https://arstechnica.com/security/2024/04/what-we-know-about-the-xz-utils-backdoor-that-almost-infected-the-world/

faq on the xz compromise/backdoor CVE-2024-3094
https://gist.github.com/thesamesam/223949d5a074ebc3dce9ee78baad9e27

examination of claims of technical solutions to xz and why they're wrong
https://federated.saagarjha.com/notice/AgPahhBPr9xHXMAPWi

OSS backdoors: the folly of the easy fix
https://lcamtuf.substack.com/p/oss-backdoors-the-allure-of-the-easy

deep inspection of the backdoor injection
https://research.swtch.com/xz-script
https://gynvael.coldwind.pl/?lang=en&id=782

interactions in open source projects (examination of xz infiltration)
https://robmensching.com/blog/posts/2024/03/30/a-microcosm-of-the-interactions-in-open-source-projects/

thread from november 2023 theorizing about a long con threat actor assuming control of a major project
https://infosec.exchange/@mariuxdeangelo/111348817163534252

thread exploring pressure on xz maintainer to hand off control of the project
https://twitter.com/robmen/status/1774067844785086775

bullying as a vulnerability in open source
https://www.404media.co/xz-backdoor-bullying-in-open-source-software-is-a-massive-security-vulnerability/

tracking jai tan's commit timestamps
https://twitter.com/birchb0y/status/1773871381890924872

examining Jia Tan's complete github commit history
https://huntedlabs.com/where-the-wild-things-are-a-complete-analysis-of-jiat95-github-history

looking into the "Jia Tan" persona
https://www.wired.com/story/jia-tan-xz-backdoor/

Sloppy OpenSSF statement (later redacted) implying Scorecard indicated xz issues
https://web.archive.org/web/20240331024907/https://openssf.org/blog/2024/03/30/xz-backdoor-cve-2024-3094/

Lessons from XZ Utils: Achieving a More Sustainable Open Source Ecosystem
https://www.cisa.gov/news-events/news/lessons-xz-utils-achieving-more-sustainable-open-source-ecosystem

Supply Chains Reading List

Hackers poison source code from largest Discord bot platform
https://www.bleepingcomputer.com/news/security/hackers-poison-source-code-from-largest-discord-bot-platform/

Overcoming Software Supply Chain Attacks
https://blog.karambit.ai/overcoming-software-supply-chain-attacks-c8746a0236ab

iconburst NPM supply chain attack
https://www.scmagazine.com/news/iconburst-supply-chain-attack-uses-typo-squatting-to-spread-malicious-javascript-packages-via-npm

Deceptive Deprecation: The Truth About npm Deprecated Packages
https://blog.aquasec.com/deceptive-deprecation-the-truth-about-npm-deprecated-packages

aquasec/CIS supply chain security guide
https://www.aquasec.com/news/software-supply-chain-security-guide-cis-aqua-security/

OWASP kube top ten risks #2: supply chain vulnerabilities
https://github.com/OWASP/www-project-kubernetes-top-ten/blob/main/2022/en/src/K02-supply-chain-vulnerabilities.md

Git Checkout Authentication to the Rescue of Supply Chain Security
https://archive.fosdem.org/2023/schedule/event/security_where_does_that_code_come_from/

Software supply chain security practices are maturing — but it's a work in progress
https://www.reversinglabs.com/blog/openssf-survey-supply-chain-security-practices

Open Source Supply Chain Security at Google
https://research.swtch.com/acmscored

CVE Half-Day Watcher
https://github.com/Aqua-Nautilus/CVE-Half-Day-Watcher

State of the Software Supply Chain:
https://www.sonatype.com/hubfs/9th-Annual-SSSC-Report.pdf

Few Open Source Projects are Actively Maintained:
https://www.infoworld.com/article/3708630/report-finds-few-open-source-projects-actively-maintained.html

The Massive Bug at the Heart of NPM:
https://blog.vlt.sh/blog/the-massive-hole-in-the-npm-ecosystem

Log4Shell Reading List

Dealing with log4shell (detection, mitigation, workarounds):
https://cloudsecurityalliance.org/blog/2021/12/14/dealing-with-log4shell-aka-cve-2021-44228-aka-the-log4j-version-2/

Keeping up with log4shell (post mortem)
https://cloudsecurityalliance.org/blog/2021/12/16/keeping-up-with-log4shell-aka-cve-2021-44228-aka-the-log4j-version-2/

Mysterious tweet hinting at the exploit:
https://twitter.com/sirifu4k1/status/1468951859381485573

Another mysterious tweet:
https://twitter.com/CattusGlavo/status/1469010118163374089

“THE” pull request:
https://github.com/apache/logging-log4j2/pull/608

Cloudflare digs for evidence of pre-disclosure exploits in the wild:
https://twitter.com/eastdakota/status/1469800951351427073

Glossary

CVE - Common Vulnerabilities and Exposures - https://cve.mitre.org/
CVSS - Common Vulnerability Scoring System - https://nvd.nist.gov/vuln-metrics/cvss
CISA - cybersecurity and infrastructure security agency - https://cisa.gov
KEV - Known Exploited Vulnerabilities - https://www.cisa.gov/known-exploited-vulnerabilities-catalog
EPSS - Exploit Prediction Scoring System - https://www.first.org/epss/
SBOM - Software Bill of Materials - https://www.cisa.gov/sbom
VEX - Vulnerability Exploitability eXchange - https://github.com/openvex/spec
CSAF - Common Security Advisory Framework - https://oasis-open.github.io/csaf-documentation/
GHSA - GitHub Security Advisory - https://github.com/advisories
OpenSSF - Open Source Security Foundation - https://openssf.org/

SBOM Takeaways

00 SBOMs enable continuous, automated security/compliance checks, reduce time spent identifying and remediating issues

01 SBOMs improve a lot of things but do not solve every problem you have

02 Log4j is extremely easy to find, OpenSSL 3 is often obscured

03 SBOMs are more effective when created by maintainers rather than consumers, but something is better than nothing

SBOM Reading List

Making Better SBOMs: https://kccncna2022.sched.com/event/182GT/ – https://www.youtube.com/watch?v=earq775L4fc

Reflections on Trusting Trust: https://www.cs.cmu.edu/~rdriley/487/papers/Thompson_1984_ReflectionsonTrustingTrust.pdf
https://web.mit.edu/6.033/2002/wwwdocs/handouts/h25-review2slides2.pdf

Introduction to SBOMs - What is it and do I need one? - https://www.youtube.com/watch?v=jVl6K5h6PzY

Generate sboms with syft and jenkins: https://www.youtube.com/watch?v=nMLveJ_TxAs

Profound Podcast - Episode 10 (John Willis and Josh Corman):
https://www.buzzsprout.com/1758599/8761108-profound-dr-deming-episode-10-josh-corman-captain-america

GitHub Self-Service SBOMs: https://github.blog/2023-03-28-introducing-self-service-sboms/