

# Scoring vulnerabilities by leveraging activity data from the Fediverse

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🏠 <https://www.vulnerability-lookup.org>

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Cédric Bonhomme - [cedric.bonhomme@circl.lu](mailto:cedric.bonhomme@circl.lu)    Alexandre Dulaunoy - [alexandre.dulaunoy@circl.lu](mailto:alexandre.dulaunoy@circl.lu)

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CIRCL <https://www.circl.lu>

## Origin of the project

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# Who is behind Vulnerability-Lookup?



Vulnerability-Lookup<sup>1</sup> is an Open Source project led by **CIRCL**.  
It is co-funded by **CIRCL** and the **European Union**<sup>2</sup>.  
Used by many organisations including CSIRTs and ENISA (EUVD).



**vulnerability**  
**-lookup**

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<sup>1</sup><https://www.vulnerability-lookup.org>

<sup>2</sup><https://github.com/ngsoti>

- `cve-search`<sup>3</sup> is an open-source tool initially developed in late 2012, focusing on maintaining a **local** CVE database.
- `cve-search` is widely used as an **internal** tool.
- The design and scalability of `cve-search` are limited. Our operational public instance at <https://cve.circl.lu> has reached a hard limit of 20,000 queries per second.
- Vulnerability sources have **diversified**, and the **NVD CVE is no longer the sole source** of vulnerability information.

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<sup>3</sup><https://github.com/cve-search/cve-search>

# Initial Challenges

- **Volume of data:** Handling a substantial dataset and heavy network traffic, currently over 1,360,500 security advisories and more than 70,000 sightings<sup>4</sup>.
- **Flexibility:** Balancing ongoing development with legacy issues while designing a future-proof architecture. It's complex and yes, sometimes chaotic<sup>5</sup>.
- **Robustness:** Validating data even when external entities don't comply with their own JSON schemas. It's not always pretty.
- **Fast lookup:** Rapidly correlating identifiers across **diverse sources**, including unpublished advisories.

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<sup>4</sup>The first sighting on Exploit-DB dates back 26 years.

<sup>5</sup>We enjoy challenges, especially when they lead to practical solutions.

# Ongoing Challenges and Development

- **CPE fragmentation:**<sup>6</sup> Tackling the fragmentation of CPEs (e.g., `cpe:/a:oracle:java` vs. `cpe:/a:sun:java`) by introducing *Organizations* as unified containers.
- **CVD process:** Building an open-source tool that fully supports the Coordinated Vulnerability Disclosure (CVD) process.<sup>7</sup>
- **Vulnerability numbering:** Enabling a new distributed approach through the Global CVE Allocation System.<sup>8</sup>
- **Scoring vulnerabilities:** Aggregating a large volume of observations from diverse advisory types to improve vulnerability scoring.

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<sup>6</sup>Well, another mess to clean up!

<sup>7</sup>Aligned with NIS 2 and the Cyber Resilience Act.

<sup>8</sup><https://gcve.eu>

# Current Sources in Vulnerability-Lookup

- **CISA Known Exploited Vulnerability** (HTTP)
- **NIST NVD CVE** (API 2.0)
- **CVEProject - cvelist** (Git submodule)
- **Fraunhofer FKIE** (Git submodule)
- **Cloud Security Alliance - GSD** (Git submodule)
- **GitHub Advisory DB** (Git submodule)
- **PySec Advisory DB** (Git submodule)
- **CSAF 2.0** (HTTP CSAF)  
CERT-Bund, Cisco, Siemens, Red Hat, Microsoft, NCSC-NL, CISA, etc.
- **VARIoT** (API)
- **Japan - JVN DB** (HTTP)
- **Tailscale** (RSS)
- **GCVE.eu source references**
- **Growing...**

**Open Data Initiative:** Regular JSON dumps published<sup>9</sup>.

<sup>9</sup><https://vulnerability.circl.lu/dumps/>

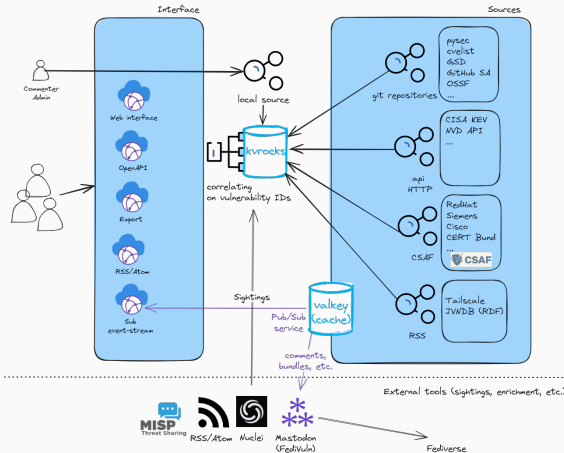
## Design and Implementation

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# Vulnerability-Lookup High-Level Architecture

Overview of the Vulnerability-Lookup architecture - <https://www.vulnerability-lookup.org>



```
$ curl -s https://vulnerability.circl.lu/api/vulnerability/last/csaf_redhat/10 | jq .[2].document.title  
"Red Hat Security Advisory: Red Hat Ceph Storage 6.1 security and bug fix update"
```

```
$ curl -s https://vulnerability.circl.lu/api/vulnerability/last/csaf_redhat/10 | jq .[2].vulnerabilities[0].cve  
"CVE-2021-4231"
```

- Documented API (OpenAPI): <https://vulnerability.circl.lu/api>
- Pagination and filtering by source
- CPE search by vendor and product name
- Many endpoints available via RSS and Atom<sup>10</sup>

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<sup>10</sup><https://www.vulnerability-lookup.org/documentation/feeds.html>

## Empowering the Community

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# Crowd-Sourced Threat Intelligence

- **Bundles:** Group similar vulnerabilities and aggregate sightings for easier tracking.
- **Comments:** Additional context such as PoCs, remediations, related insights.
- **Tags:** Use the MISP Vulnerability Taxonomy to annotate comments<sup>11</sup>. Example:

```
vulnerability:information=remediation
```

- **Sightings:** Report real-world observations of vulnerabilities, including metadata like timestamps and sources.

```
{  
  "uuid": "f9ec8b2c-2ceb-4c05-b052-264b51c6a3ee", "vulnerability_lookup_origin": "1a89b78e-f703-45f3-bb86-59eb712668bd",  
  "author": "9f56dd64-161d-43a6-b9c3-555944290a09", "creation_timestamp": "2025-04-17T19:14:32.000000Z",  
  "vulnerability": "CVE-2025-32433",  
  "type": "exploited",  
  "source": "https://gist.github.com/numanturle/b7333fb02a4ee3618995bab9b62c507"  
}
```

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<sup>11</sup>[https://www.misp-project.org/taxonomies.html#\\_vulnerability\\_3](https://www.misp-project.org/taxonomies.html#_vulnerability_3)

# Types of Sightings

Type	Description	Negative/Opposite
seen	The vulnerability was mentioned, discussed, or observed by the user.	-
confirmed	The vulnerability has been verified by an analyst.	X
exploited	The vulnerability was actively exploited and observed by the user reporting the sighting.	X
patched	The vulnerability was successfully mitigated or patched by the user reporting the sighting.	X

**Table 1:** Types of vulnerability sightings

# Automated Sightings: Tools and Sources

Automatically gathering crowd-sourced intelligence without requiring direct user contributions to our platform.

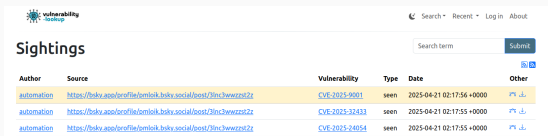
- **Social Platforms:** Fediverse, Bluesky
- **Threat Intelligence Tools:** MISP, Nuclei
- **Content Feeds:** RSS/Atom, curated web pages, GitHub Gist
- **Specialized Projects:** ShadowSight, ExploitDBSighting
- **Community Contributions:** Passive signals and indirect data enrichment

## Scoring Vulnerabilities




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# Sightings Detection Rate and Types of Sightings

- A high rate of sightings (type *seen*) often correlates with high or critical severity vulnerabilities<sup>12</sup>.
- Early sightings of type *exploited* (e.g., proof-of-concept code) or *confirmed* (e.g., detection templates for tools like Nuclei) can signal emerging threats.
- Sightings can sometimes be detected **before any official advisory is published**.



The screenshot shows the 'Vulnerability Sighting' website interface. At the top, there is a navigation bar with 'Search', 'Recent', 'Log in', and 'About'. Below this is a search bar with a 'Submit' button. The main content area is titled 'Sightings' and contains a table with the following columns: Author, Source, Vulnerability, Type, Date, and Other. The table lists three sightings, all of type 'seen' and dated '2025-04-21 02:17:55 +0000'. The first two sightings are for 'CVE-2025-9901' and 'CVE-2025-32433', both with the author 'automation' and source 'https://bsky.app/profile/omisoik.bsky.social/post/3lnc3wvzst2z'. The third sighting is for 'CVE-2025-24054', also with the author 'automation' and the same source. Each row in the table has a small icon in the 'Other' column.

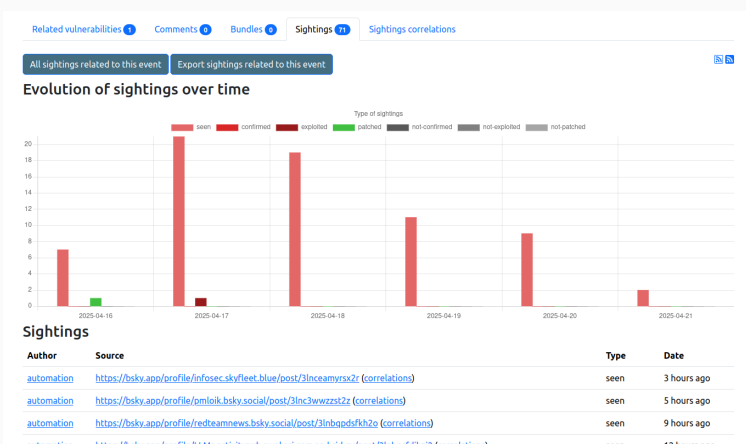
Author	Source	Vulnerability	Type	Date	Other
automation	<a href="https://bsky.app/profile/omisoik.bsky.social/post/3lnc3wvzst2z">https://bsky.app/profile/omisoik.bsky.social/post/3lnc3wvzst2z</a>	<a href="#">CVE-2025-9901</a>	seen	2025-04-21 02:17:55 +0000	
automation	<a href="https://bsky.app/profile/omisoik.bsky.social/post/3lnc3wvzst2z">https://bsky.app/profile/omisoik.bsky.social/post/3lnc3wvzst2z</a>	<a href="#">CVE-2025-32433</a>	seen	2025-04-21 02:17:55 +0000	
automation	<a href="https://bsky.app/profile/omisoik.bsky.social/post/3lnc3wvzst2z">https://bsky.app/profile/omisoik.bsky.social/post/3lnc3wvzst2z</a>	<a href="#">CVE-2025-24054</a>	seen	2025-04-21 02:17:55 +0000	

- Continuous exploitation patterns are frequently observed through sources like The Shadowserver Foundation or MISP.

<sup>12</sup>Don't underestimate the hype surrounding some vulnerabilities.



## Early PoC (erlang / otp)

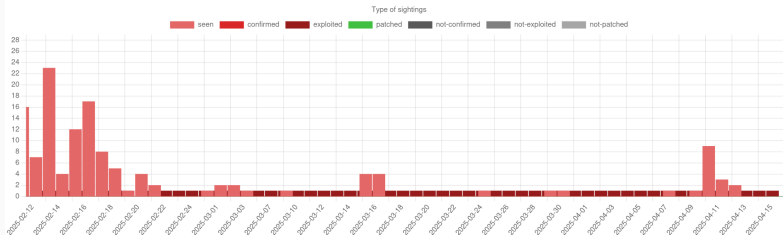


<https://vulnerability.circl.lu/vuln/CVE-2025-32433#sightings>

TLP: CLEAR

# Continuous Exploitations (Palo Alto Networks / Cloud NGFW)

Evolution of sightings over time



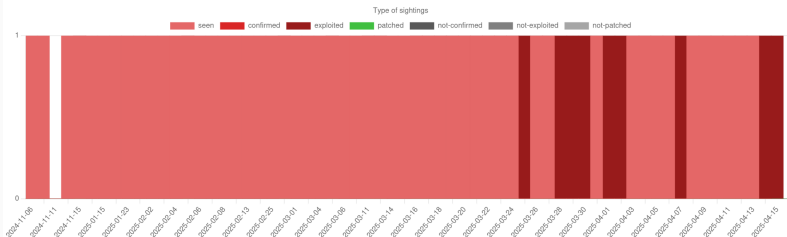
## Sightings

Author	Source	Type	Date
<a href="#">automation</a>	The Shadowserver (honeypot/exploited-vulnerabilities) - (2025-04-16) ( <a href="#">correlations</a> )	exploited	1 day ago
<a href="#">automation</a>	<a href="https://bsky.app/profile/christopherkunz.bsky.social/post/3lmu2zatyx22z">https://bsky.app/profile/christopherkunz.bsky.social/post/3lmu2zatyx22z</a> ( <a href="#">correlations</a> )	seen	2 days ago
<a href="#">automation</a>	<a href="https://chaos.social/users/christopherkunz/statuses/114340622271163262">https://chaos.social/users/christopherkunz/statuses/114340622271163262</a> ( <a href="#">correlations</a> )	seen	2 days ago
<a href="#">automation</a>	The Shadowserver (honeypot/exploited-vulnerabilities) - (2025-04-15) ( <a href="#">correlations</a> )	exploited	2 days ago

<https://vulnerability.circl.lu/vuln/CVE-2025-0108#sightings>

# Continuous Exploitations (D-Link / DNS-320)

Evolution of sightings over time



## Sightings

Author	Source	Type	Date
<a href="#">automation</a>	The Shadowserver (honeypot/exploited-vulnerabilities) - (2025-04-16) ( <a href="#">correlations</a> )	exploited	1 day ago
<a href="#">automation</a>	The Shadowserver (honeypot/common-vulnerabilities) - (2025-04-16) ( <a href="#">correlations</a> )	seen	1 day ago
<a href="#">automation</a>	The Shadowserver (honeypot/common-vulnerabilities) - (2025-04-15) ( <a href="#">correlations</a> )	seen	2 days ago
<a href="#">automation</a>	The Shadowserver (honeypot/exploited-vulnerabilities) - (2025-04-15) ( <a href="#">correlations</a> )	exploited	2 days ago

<https://vulnerability.circl.lu/vuln/CVE-2024-10914#sightings>

# Last Month's Most Sighted Vulnerabilities

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CVE-2025-29927					3	11	54	42	20	15	7	10	1	3	1	1	4	4	1	2	1		2	1					1	1		
CVE-2025-22457																		39	38	11	12	16	8	6	5	13	3	4	3	4		14
CVE-2025-24813	13	15	12	13	8	3	2	11	2	1		1	1	3	5	7	7	4		2	1		1	2			1					
CVE-2025-1974								5	24	11	25	7	8	1	5	6	2	7							1							
CVE-2025-2825									2	10	7	2	2	11	9	12	7	2	2	2	3	6		5	3	1		1	3			
CVE-2025-29824																						12	29	11	4	2	1	4	2	3	14	
CVE-2025-2783									1	27	15	12	8	7	2		1	1	1													
CVE-2025-30066	12	15	14	3	4	2	1	6	2	1	1				2								1		1							
CVE-2025-24200															3	3	4	3	1	1		3	1		12	30						
CVE-2017-18368	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
CVE-2015-2051	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
CVE-2025-30406																		1	2				2	3	6	2	2		8	14	3	14
CVE-2025-0108	1	5	5	1	1	1	1	1	1	1	2	1	1	1	1	1	3	1	1	1	1	1	1	1	2	1	2	3	11	3		

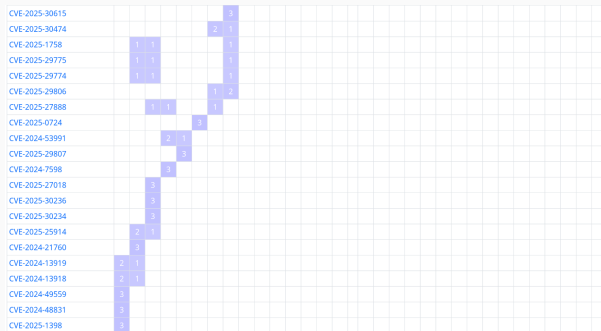
- **CVE-2025-22457:** Ivanti / Connect Secure — Severity: 10.0 (Critical)
- **CVE-2025-29927:** Vercel / Next.js — Severity: 9.1 (Critical)

## Other Examples

Vulnerability	Product	Sighting count	EPSS	Severity
CVE-2025-29927	next.js	167	89.24% (0.99521)	9.1
CVE-2025-24813	Apache Tomcat	128	93.55% (0.99827)	9.2
CVE-2024-4577	PHP	190	94.38% (0.99961)	9.8
CVE-2025-0282	Connect Secure	243	90.87% (0.99618)	9.0
CVE-2024-55591	FortiOS	126	92.79% (0.99756)	9.8
CVE-2024-10914	D-Link DNS-320	81	93.73% (0.9985)	9.2
CVE-2020-21650	Myucms	57	2.48% (0.83998)	9.1

**Table 2:** Top vulnerabilities from our April 2025 report, based on sightings and scoring data.

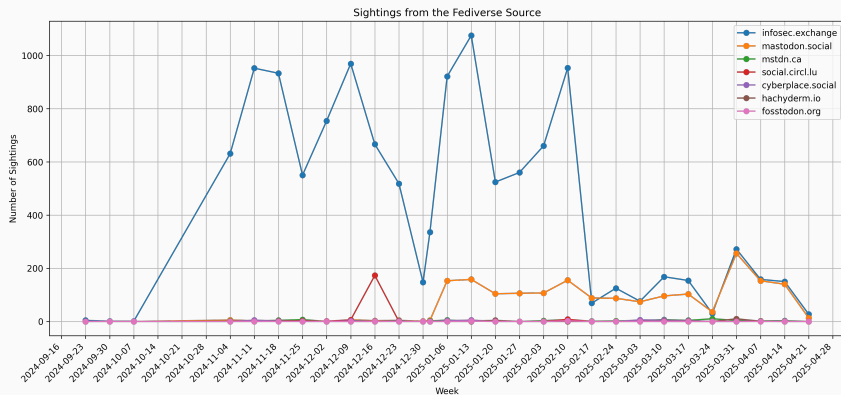
# Least Sighted Vulnerabilities in the Last Month



These vulnerabilities typically have low EPSS scores and are often rated as low or medium severity based on CVSS.

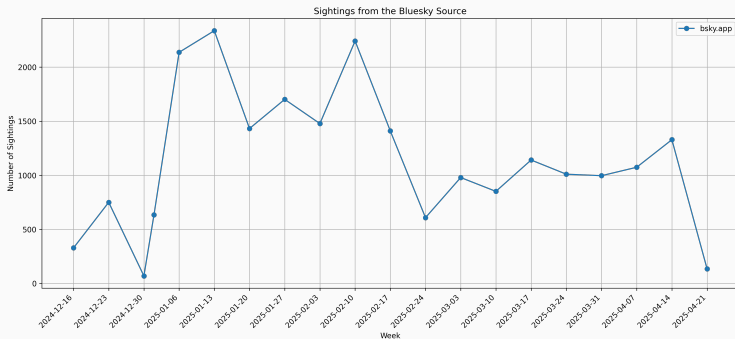
This trend is likely influenced by the fact that EPSS also incorporates data from publicly available web sources.

# Evolution of Sightings from the Fediverse



*Is there a geopolitical influence on social network activity?*

# Evolution of Sightings from Bluesky



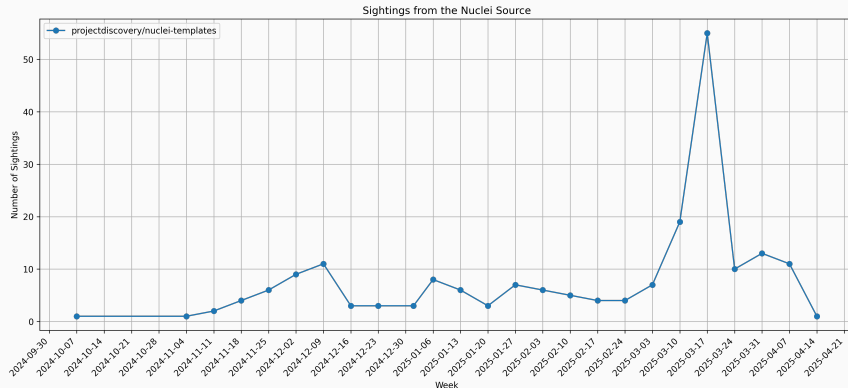
We observed the deletion of hundreds of posts.<sup>13</sup>  
Several accounts were also closed in mid-February.<sup>14</sup>

<sup>13</sup><https://vulnerability.circl.lu/sightings/?query=screaminggoat>

<sup>14</sup><https://cyberplace.social/@GossiTheDog/114275910650393298>



# Evolution of Sightings from Nuclei

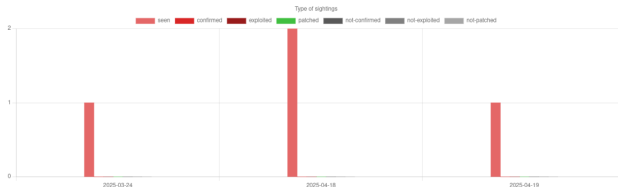


Typical timeline of a high-severity vulnerability:  
<https://vulnerability.circl.lu/vuln/CVE-2025-29927#sightings>

# Tracking the Exploitability of Vulnerabilities Prior to Public Disclosure

- **Google / Android:** <https://vulnerability.circl.lu/vuln/CVE-2024-43093#sightings>
- **Speedify VPN (macOS):** <https://vulnerability.circl.lu/vuln/CVE-2025-25364#sightings>
- **SourceCodester:** <https://vulnerability.circl.lu/vuln/CVE-2025-3821#sightings>
  - Low visibility, no EPSS score, few sightings

Evolution of sightings over time



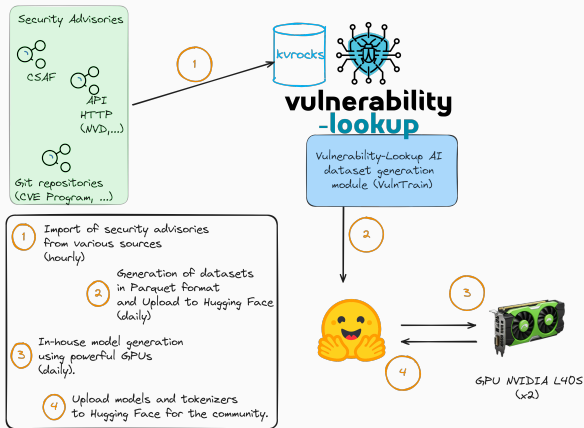
Sightings

Author	Source	Type	Date
<a href="#">automation</a>	<a href="https://infosec.exchange/users/dragonjar/statuses/114364291565132421">https://infosec.exchange/users/dragonjar/statuses/114364291565132421</a> (correlations)	seen	1 day ago
<a href="#">automation</a>	<a href="https://bsky.app/profile/r-netsec.bsky.social/post/3ln4hb7anxx2g">https://bsky.app/profile/r-netsec.bsky.social/post/3ln4hb7anxx2g</a> (correlations)	seen	2 days ago
<a href="#">automation</a>	<a href="https://bsky.app/profile/r-netsec-bot.bsky.social/post/3ln4arcbktd2z">https://bsky.app/profile/r-netsec-bot.bsky.social/post/3ln4arcbktd2z</a> (correlations)	seen	2 days ago
<a href="#">automation</a>	<a href="https://infosec.exchange/users/threatcodex/statuses/114217935883108579">https://infosec.exchange/users/threatcodex/statuses/114217935883108579</a> (correlations)	seen	27 days ago

## Closing

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# NLP, LLMs: What We're Testing and Where We're Headed



- Predicting CPE names using a novel approach (beyond CPE Guesser)
- Automated threat intelligence tagging using ATT&CK mappings
- Vulnerability type classification via CWE mappings
- Ongoing experimentation and refinement

<https://huggingface.co/CIRCL>

# Future Development

- Deeper analysis of the content and context surrounding sightings.
- Allocation of vulnerability identifiers aligned with the GCVE system.
- Full-text search capabilities across all sources.
- Integration of scoring models such as EPSS and Vuln4Cast<sup>15</sup>, with plans to test them on our dataset to improve reproducibility.
- Synchronization between multiple Vulnerability-Lookup instances.




The project is evolving rapidly — we always welcome feedback and feature suggestions!


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<sup>15</sup><https://github.com/FIRSTdotorg/Vuln4Cast>

# References

 <https://www.vulnerability-lookup.org>

 <https://vulnerability.circl.lu>

 <https://github.com/vulnerability-lookup/vulnerability-lookup>

 <https://social.circl.lu/@circl>

# Thank you for your attention

- Issues, new sources of advisories or ideas:  
`https://github.com/vulnerability-lookup/vulnerability-lookup`
- For support and questions, contact: `info@circl.lu`