CIRCL
Computer Incident
Response Center
Luxembourg

Vulnerability Management

NISDUC 2025

https://www.vulnerability-lookup.org

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CIRCL https://www.circl.lu

More than 70% of ransomware attacks in Luxembourg originated from unpatched infrastructure during the initial access phase.

Origin of the project

Who is behind Vulnerability-Lookup?

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

[1] https://www.vulnerability-lookup.org
[2] https://github.com/ngsoti

Origin

- `cve-search`[3] 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.

[3] `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[4].
- **Flexibility:** Balancing ongoing development with legacy issues while designing a future-proof architecture. It's complex and yes, sometimes chaotic[5].
- **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- **Fast lookup:** Rapidly correlating identifiers across **diverse sources**, including unpublished advisories.

[4] The first sighting on Exploit-DB dates back 26 years.
[5] We enjoy challenges, especially when they lead to practical solutions.

Ongoing Challenges and Development

- **CPE fragmentation:**[6] 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.[7]
- **Vulnerability numbering:** Enabling a new distributed approach through the Global CVE Allocation System.[8]
- **Scoring vulnerabilities:** Aggregating a large volume of observations from diverse advisory types to improve vulnerability scoring.

[6] Well, another mess to clean up!
[7] Aligned with NIS 2 and the Cyber Resilience Act.
[8] `https://gcve.eu`

Current Sources in Vulnerability-Lookup

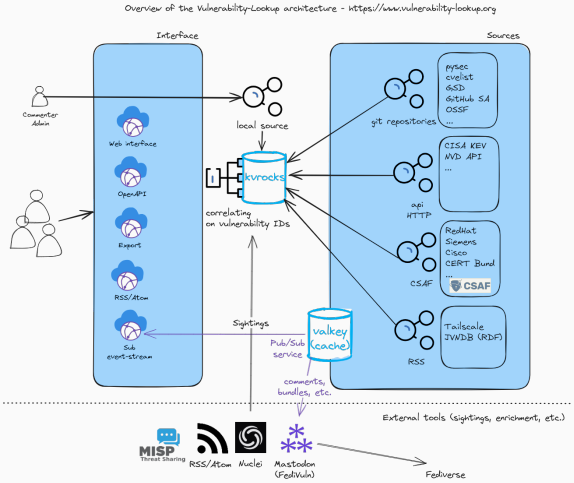
- **CISA Known Exploited Vulnerability** (HTTP)
- **NIST NVD CVE** (API 2.0)
- **CVEProject - cvelist** (Git submodule)
- **Fraunhofer FKIE** (Git submodule)
- **Cloud Security Alliance - GSD** (Git submodule)
- **GitHub Advisory DB** (Git submodule)
- **PySec Advisory DB** (Git submodule)
- **CSAF 2.0** (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[9].

[9] https://vulnerability.circl.lu/dumps/

Design and Implementation

Vulnerability-Lookup High-Level Architecture



TLP:CLEAR

Extended API

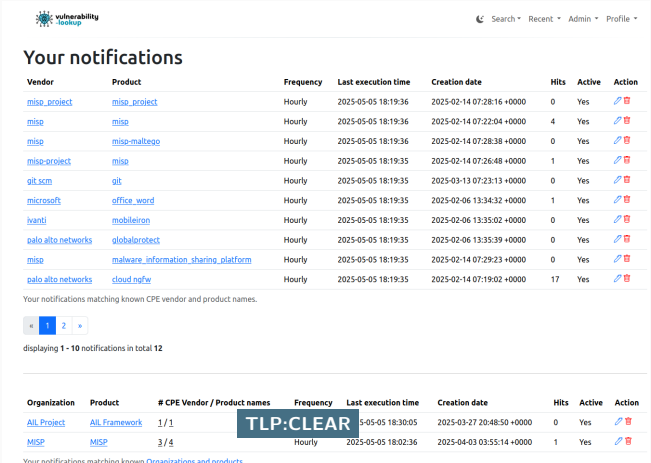
```
$ curl -s https://vulnerability.circl.lu/api/vulnerability/last/csaf_redhat/10 | jq .[2].document.title
"Red Hat Security Advisory: Red Hat Ceph Storage 6.1 security and bug fix update"

$ 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[10]

[10] https://www.vulnerability-lookup.org/documentation/feeds.html

Email Notification and Vulnerability Tracking

- Vulnerability-Lookup includes an efficient system for automatic email notifications.
- Users can create notification lists based on vendor name, product name, or organization name.



Empowering the Community

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[11]. 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/b7333fb02a4ee3618995babc9b62c507"
}
```


[11] 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

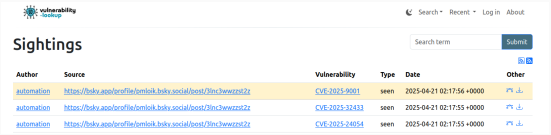
Automatically gathering crowd-sourced intelligence without requiring direct user contributions to our platform.

- **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

Sightings Detection Rate and Types of Sightings

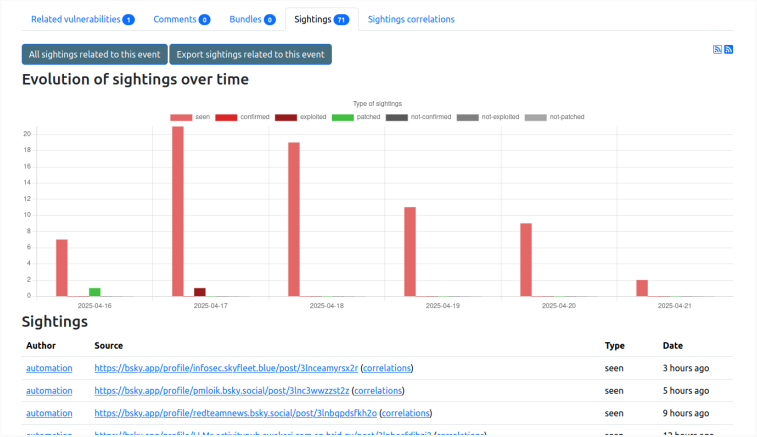
- A high rate of sightings (type *seen*) often correlates with high or critical severity vulnerabilities[12].
- Early sightings of type *exploited* (e.g., proof-of-concept code) or *confirmed* (e.g., detection templates for tools like Nuclei) can signal emerging threats.
- Sightings can sometimes be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



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

[12] Don't underestimate the hype surrounding some vulnerabilities.

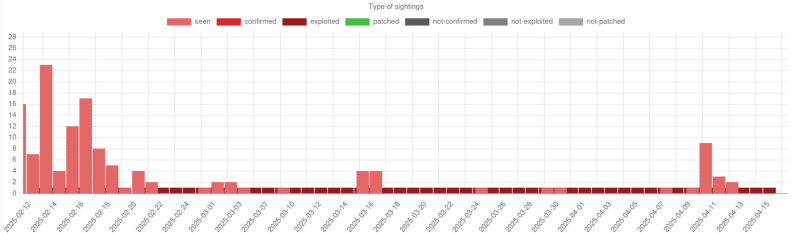
Early PoC (erlang / otp)



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

Continuous Exploitations (Palo Alto Networks / Cloud NGFW)

Evolution of sightings over time



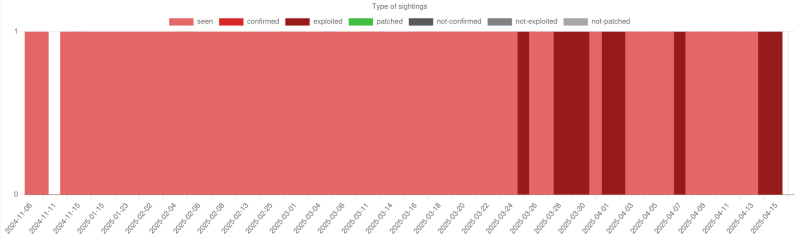
Sightings

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

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

Continuous Exploitations (D-Link / DNS-320)

Evolution of sightings over time

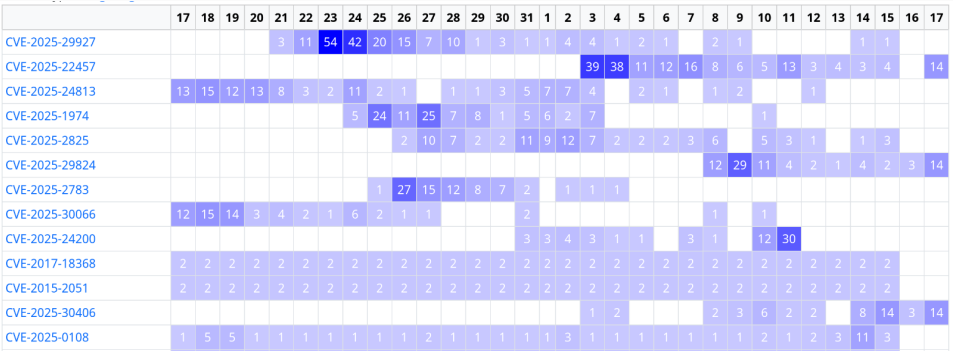


Sightings

Author	Source	Type	Date
automation	The Shadowserver (honeypot/exploited-vulnerabilities) - (2025-04-16) (correlations)	exploited	1 day ago
automation	The Shadowserver (honeypot/common-vulnerabilities) - (2025-04-16) (correlations)	seen	1 day ago
automation	The Shadowserver (honeypot/common-vulnerabilities) - (2025-04-15) (correlations)	seen	2 days ago
automation	The Shadowserver (honeypot/exploited-vulnerabilities) - (2025-04-15) (correlations)	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		

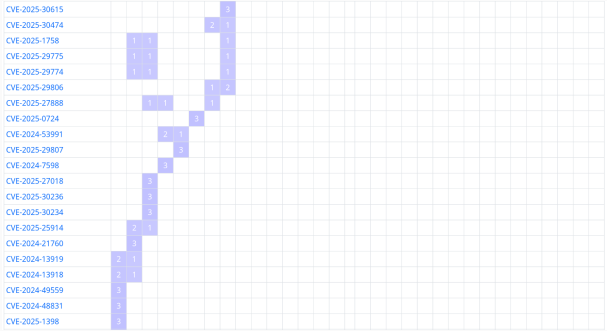
- **CVE-2025-22457:** Ivanti / Connect Secure — Severity: 10.0 (Critical)
- **CVE-2025-29927:** Vercel / Next.js — Severity: 9.1 (Critical)

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.

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

Closing

Direct Benefits for an Organization

- Vendors and software[13] can be **monitored and tracked** easily via email, the web interface, or the API.
- Running a local instance[14] of Vulnerability-Lookup is fully supported.
- Integrating the **Coordinated Vulnerability Disclosure (CVD)** process into the same tool streamlines collaboration across multiple organizations.
- Join us at tomorrow's workshop.

[13] Assuming your organization has a well-maintained CMDB or software/hardware inventory.
[14] We welcome organizations to use our online service. However, since the software is open source, you can host your own instance and remain independent.

Future Development

- Deeper analysis of the content and context surrounding sightings.
- Allocation of vulnerability identifiers aligned with the GCVE system[15].
- Full-text search capabilities across all sources.
- Integration of scoring models such as EPSS and Vuln4Cast[16], 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!

[15] https://gcve.eu/
[16] https://github.com/FIRSTdotorg/Vuln4Cast

References

https://www.vulnerability-lookup.org

NIS2 and Vulnerability-Lookup
https://www.vulnerability-lookup.org/nis2-directive/

Online public version 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