

Sources

INBOX

https://www.cs.hmc.edu/%7Egeoff/classes/hmc.cs135.201001/homework/fuse/fuse_doc.html (from <https://unix.stackexchange.com/questions/325473/in-fuse-how-do-i-get-the-information-about-the-user-and-the-process-that-is-trying>)

- <https://security.googleblog.com/2022/12/memory-safe-languages-in-android-13.html> (from [1])

[2]

Difference:

- “safety concerns go beyond type systems”

Notes

Introduction

[2] “Even worse, pervasive use of pointer aliasing, pointer arithmetic, and unsafe type casts keeps modern systems beyond the reach of software verification tools.”

CVE data

[3], [4] (ch-04, “unsafe language”)

methodology:

- for now, only linux kernel CVEs (then we can filter by CPE). this one paper also primarily cites a CVE analysis targeting linux kernel. EXTRA also consider other sources.
- maybe, for now, just focus on the CVE categories and maybe pick out some examples. looking at 3500 CVEs would be overkill anyways.
- [3] says that, in the last 10 years, 3439/3918 == 87.8% of linux kernel CVEs are memory-related (which we would atleast partially solve with Rust)
- EXTRA overflows would be interesting, but require more investigation into Rusts overflow behavior.

beispiel-CVEs

CVE	problem	solution	
2011-0699	unerwartete signed/unsignedness von operatoren führt zum overflow (und AFAICS zu negativen kmalloc sizes)	ich habe wrapper <code>Wrapping<Num></code> und <code>Saturating<Num></code> , und ich kann trivialerweise zB noch <code>Checked<Num></code> bauen. damit gebe ich gleichzeitig das verhalten des systems vor (kein surprise overflow) und habe zusätzlich eine klare annotation ggü der programmierperson, welches verhalten auftreten wird.	●
2025-21646	the <code>`prodfs`</code> filesystem (<code>`prodfs`</code>) expects maximum path length of 255, this was overseen by the <code>`afs`</code> filesystem (<code>`afs`</code>) implementors, leading to a runtime error	if <code>`prodfs`</code> API were implemented per my concept, maximum path length could be encoded in the type, so compiler could warn/error on oversight	●

``prodfs``

maybe:

- <https://nvd.nist.gov/vuln/detail/CVE-2025-21646>
- <https://nvd.nist.gov/vuln/detail/CVE-2026-23147>
- ▶ problem:

- rust löst: :green

Implementation

The Rust Project Developers. 2017. Implementation of Rust stack unwinding. <https://doc.rust-lang.org/1.3.0/std/rt/unwind/>.

Bibliography

- [1] L. Seidel and J. Beier, “Bringing Rust to Safety-Critical Systems in Space,” in *2024 Security for Space Systems (3S)*, 2024, pp. 1–8. doi: 10.23919/3S60530.2024.10592287.
- [2] A. Balasubramanian, M. S. Baranowski, A. Burtsev, A. Panda, Z. Rakamarić, and L. Ryžhyk, “System Programming in Rust: Beyond Safety,” in *Proceedings of the 16th Workshop on Hot Topics in Operating Systems*, in HotOS '17. Whistler, BC, Canada: Association for Computing Machinery, 2017, pp. 156–161. doi: 10.1145/3102980.3103006.
- [3] cvedetails.com, “CVEs on Linux Kernel Machines.” Accessed: Feb. 15, 2026. [Online]. Available: https://www.cvedetails.com/product/47/Linux-Linux-Kernel.html?vendor_id=33
- [4] H. Chen, Y. Mao, X. Wang, D. Zhou, N. Zeldovich, and M. F. Kaashoek, “Linux kernel vulnerabilities: State-of-the-art defenses and open problems,” in *Proceedings of the Second Asia-Pacific Workshop on Systems*, 2011, pp. 1–5.

``afs`` – the ``afs`` filesystem: TODO 1

``procfs`` – the ``procfs`` filesystem: TODO 1, 1, 1