

Rust Munich Meetup

#5 Remote



Secure Computing:
interactive intro to building a unikernel



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Hi, I'm Sven

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Take Aways

- **What is a unikernel**
- **What is RustyHermit**
- **How to build your own application as a unikernel**

Experts disclose 6 critical flaws affecting popular **#Realtek** Wi-Fi module for widely used in millions of embedded devices—2 can be exploited without requiring Wi-Fi **#password**, and the other allows exploitation of Wi-Fi client and full takeover.

thehackernews.com/2021/02/critic...

#infosec



Critical Bugs Found in Popular Realtek Wi-Fi Module for Embedded Devices

Critical Full Takeover Bugs Found in Popular Realtek Wi-Fi Module for Embedded Devices

thehackernews.com

9:50 AM · Feb 4, 2021 · Twitter Web

<https://www.zdnet.com> › Topic › Security ▼

Microsoft: 70 percent of all security bugs are memory safety ...

Feb 11, 2019 — Microsoft: 70 percent of all security bugs are memory safety issues. Around 70 percent of all the vulnerabilities in Microsoft products addressed through a security update each year are memory safety issues; a Microsoft engineer revealed last week at a security conference.

<https://www.zdnet.com> › Blog › Zero Day ▼

Chrome: 70% of all security bugs are memory safety issues ...

May 23, 2020 — The percentage was compiled after Google engineers analyzed 912 security bugs fixed in the Chrome stable branch since 2015, bugs that had a "high" or "critical" severity rating. ... The number is identical to stats shared by Microsoft.

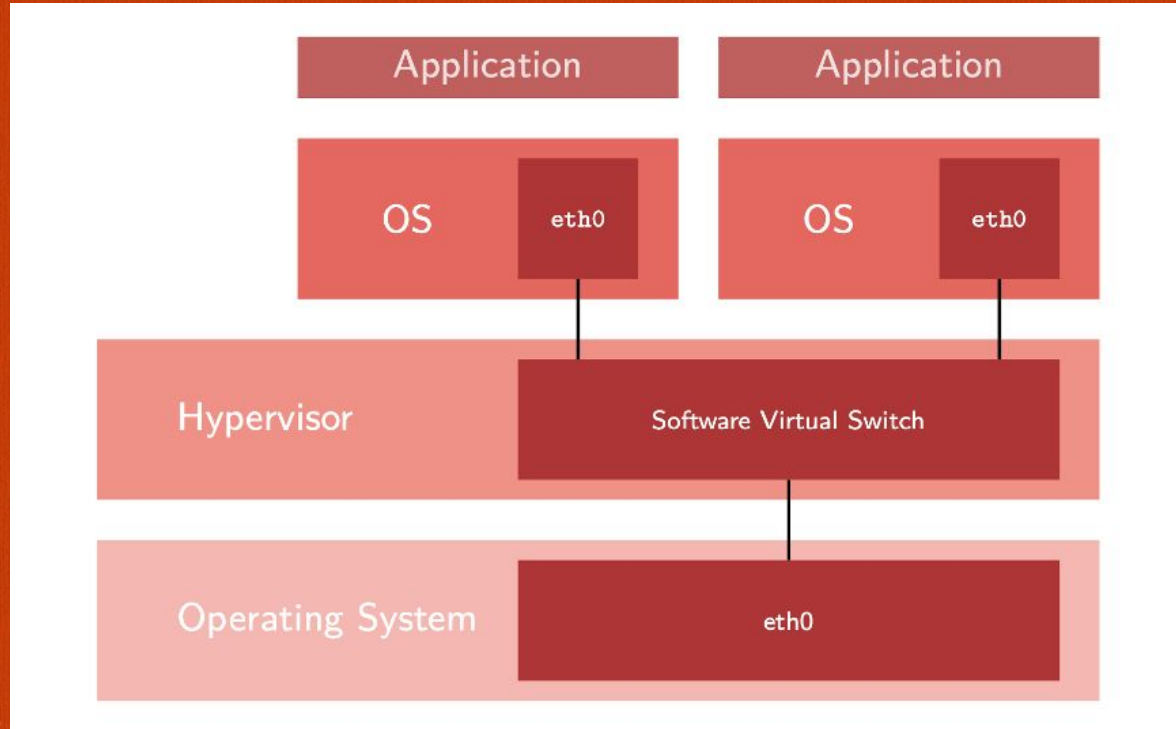
<https://blogs.grammatech.com> › memory-safety-issues-a... ▼

Memory Safety Issues Are Still the Leading Source of Security

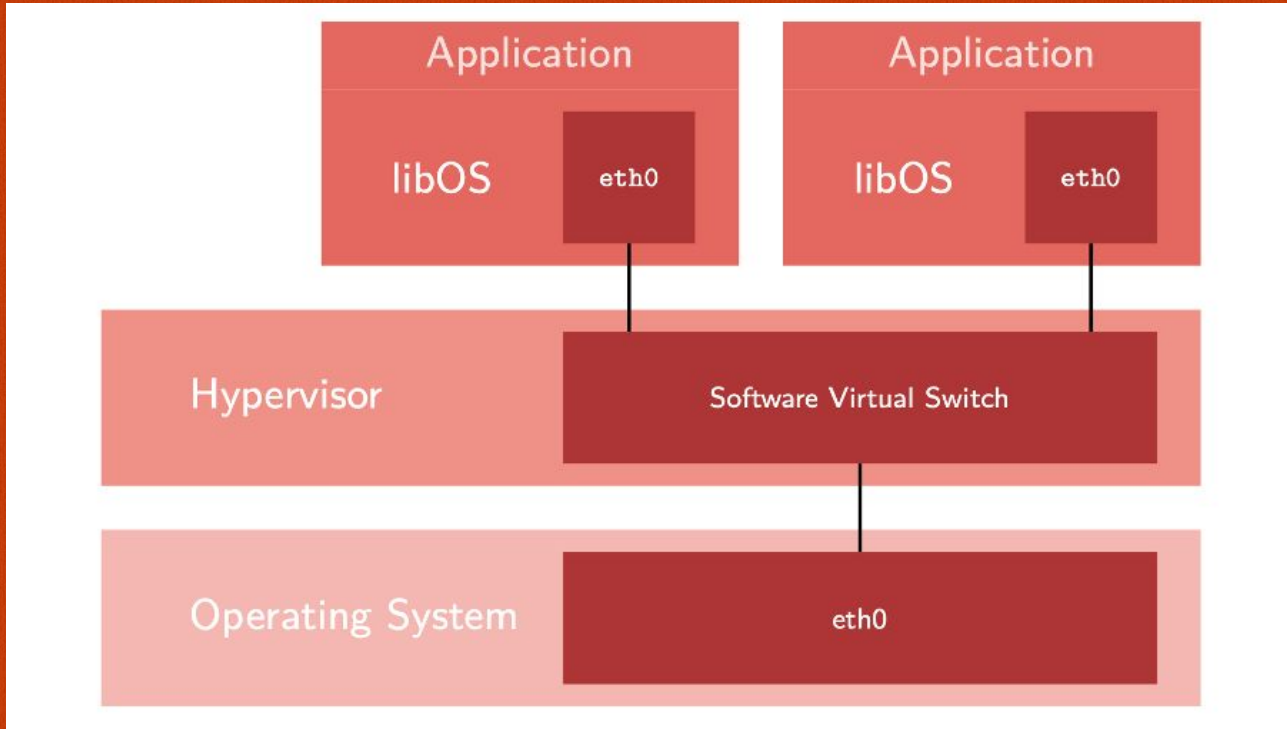
Microsoft's data shows that for at least the last 12 years, memory safety issues have been the ... Memory Safety Issues Still the Cause of Security Bugs pic 1.

The flaws concern a mix of stack overflow, and out-of-bounds reads that stem from the Wi-Fi module's WPA2 four-way handshake mechanism during authentication.

Virtual Machines



Unikernels



Unikernels

- **Single-purpose virtual machines**
- **Lightweight**
- **Performant (like Jitsu as DNS Server + Application)**
- **Secure**
- **Memory isolation between safe and unsafe kernel code**
(possible in RustyHermit)

RustyHermit

- **Written in Rust**
- **Smoltcp as safe network stack**
- **Libhermit-rs as “lib-os”**
- **Compiles as own architecture “x86_64-unknown-hermit”**
- **Separated bootloader - rusty-loader (for qemu)**
- **Own minimal hypervisor - uhyve**

Demo

<https://github.com/sassman/rust-munich-meetup-5>

Caveats

- **Single process only (no fork)**
- **Non-blocking-io not yet supported (soon)**
- **Limited network drivers (virtio_net / rtl8139)**
- **Only with rust nightly**

References

<https://github.com/hermitcore/rusty-hermit>

<https://rust-osdev.com/showcase/rusty-hermit/>

<https://www.ssrg.ece.vt.edu/papers/vee20-mpk.pdf>

Q & A